FORECASTING AND TECHNOLOGY FOR WATER MANAGEMENT

HEARINGS

BEFORE THE

SUBCOMMITTEE ON
INVESTIGATIONS AND OVERSIGHT

OF THE

COMMITTEE ON
SCIENCE AND TECHNOLOGY
U.S. HOUSE OF REPRESENTATIVES

NINETY-EIGHTH CONGRESS

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FORECASTING AND TECHNOLOGY FOR WATER MANAGEMENT

THURSDAY, OCTOBER 13, 1983

House of Representatives,
Committee on Science and Technology,
Subcommittee on Investigations and Oversight,
Washington, D.C.

The subcommittee met, pursuant to notice, at 9:30 a.m., at Garrett Junior High School Auditorium, Boulder City, Nev., Hon. Harry M. Reid presiding.

Mr. Reid. This committee of the Congress of the United States is called to order.

I would first like to introduce the members of the panel who are here with me today. Seated to my immediate right is Congressman Durbin, Richard Durbin, who represents the State of Illinois. Congressman Durbin is a Member of Congress. Previously he was in the Illinois Senate serving as parliamentarian.

Seated to my far right is Congressman Mervin Dymally, who represents Compton, Calif. Congressman Dymally was former Lieutenant Governor of California, served in the California State Legislature for approximately 10 years. Interestingly, Congressman Dymally is also a doctor, having a Ph.D.

To my left is Congressman Alfred McCandless who represents the Riverside, Calif. area. Congressman McCandless has been a member of the Riverside County Government for over 10 years prior to his coming to Congress.

Seated to my left is the chief of staff of the Science and Technology Oversight and Investigations Subcommittee, Bob Nicholas.

We are going to have later today another Member of Congress who will be here who is arriving late, Congressman Howard Nielson from Utah. Congressman Nielson is going to add a great perspective to these hearings. Congressman Neilson is also a Ph.D., having been a professor of statistics at Brigham Young University.

Before we begin, I thought it would be helpful to explain a little bit about what we are doing here today. Congress is very much aware of the damage caused by the flooding this summer, but I believe there are some areas where we need additional information. The purpose of the hearing is to obtain this information.

Today in Boulder City, we will examine the performance of the Federal Emergency Management Agency as it developed this past summer.

Tomorrow we will focus on the role of the Bureau of Reclamation and the National Weather Service, both with respect to this summer's disaster as well as to flood control in general. We will then take this information back to our colleagues in Congress and develop recommendations for legislation or administrative action that we think necessary.

Everyone in the room is aware of the damage caused this summer by the flooding of the lower Colorado River. Resort owners, if their property was not damaged, their best business season was ruined, and in the Topark Marsh community south of here, residents' trailer homes were flooded and may remain that way even today.

Local governments with already strapped budgets are now facing extensive repairs to roads. Problems with ground water and mosquitos are presenting potential health hazards and health concerns. For the Federal Government, this summer's events meant some $50 million damages to our parks and Glen Canyon Dam alone.

How could this flood have been avoided? This is the essential question we seek to answer today and tomorrow during our hearings.

It is our intention to examine not only how the floods were caused but also to evaluate what steps the Federal Government might have taken to avoid flooding.

Our intent is to be productive, to learn from our mistakes and not to cast blame. Last month I attended some very useful hearings on this problem held by my friend and colleague, Morris Udall of Arizona, who chairs the House of Representatives Committee of the Interior.

Questions were raised at that time whether the operating criteria or the way we run the river needed to be modified. If we are going to attempt to change the criteria, Congress needs to know precisely how that can and should be done. It is not enough to merely say, change it.

The Udall hearings also brought to light some concerns about the adequacy of the weather forecast given to the Bureau of Reclamation in earlier parts of the year. We intend to explore the question in some depth tomorrow. Obviously, the Bureau cannot operate the river correctly if they are not getting the most accurate and up-to-date weather information.

But we begin our hearing today with an examination of the consequences of flooding and a look at the response of the Federal Emergency Management Agency, the agency with prime responsibility for aiding citizens and local agencies in the event of a disaster.

FEMA along with other agencies such as the Small Business Administration were established to provide shelter for those without homes, loans for those who needed funds to rebuild their homes, assistance to businessmen who needed to get back on their feet again, and local governments who just were not able to shoulder the cost of a national disaster such as flooding.

We will have some hard questions for FEMA and its related agencies today, because if I heard it once I have heard it a hundred times, FEMA isn't responsive to the needs of the people it has been established to help.

What Congress needs to know and the purpose of these hearings is how we can improve the performance of FEMA, the Small Business Administration, and the National Weather Service and perhaps even the other governmental agencies, and guarantee to the best of our ability that Federal agencies fulfill their responsibilities and obligations to the taxpayers.

I would like to acknowledge my appreciation to my colleagues who have traveled many miles to get here during this recent period when they could as well be back working on things in their district. Of course, they have concerns because they are part of this committee that is functioning to better determine how we can answer the problems that relate to weather service and FEMA among other things.

I would like to introduce to everyone here someone whose name is synonymous with Boulder City, and that is the former county commissioner, now with the Bureau of Reclamation, Robert Broadbent.

Where are you, Mr. Broadbent?

The format of the congressional hearings today will be as they are in Washington, witnesses will come forward.

This morning we are going to hear from the Honorable Richard Bryan, Governor of the State of Nevada.

Governor Bryan.

STATEMENT OF HON. RICHARD H. BRYAN, GOVERNOR, STATE OF NEVADA, ACCOMPANIED BY JACK L. STONEHOCKER, CHIEF EXECUTIVE OFFICER, COLORADO RIVER COMMISSION

Mr. **Reid**. Governor Bryan is on a very tight schedule and I appreciate his taking the time to be here. If time permits, we will have time to ask the Governor a few questions after.

Governor Bryan.

Governor **Bryan**. Mr. Chairman and members of the Subcommittee on Investigation and Oversight, I appreciate the opportunity to appear here today and present testimony.

From the information provided by the agencies involved in monitoring precipitation——

Mr. **Reid**. Sorry to interrupt. It is one of those small microphones. We can't hear you

Governor **Bryan**. Mr. Chairman and members of the congressional Subcommittee on Investigation and Oversight, I appreciate the opportunity to appear before you this morning and to offer testimony.

From the information provided by the agencies involved in monitoring precipitation, snowpack, weather, and river flows along the Colorado River, it appears that 1983 has been a very unusual year.

There were late heavy snowstorms over the mountains which provided water to the Colorado River, temperatures remained unseasonably low late into the season and were followed by a rapid warming trend.

These unusual temperatures combined with heavy snowpack sent water cascading into the tributaries and subsequently into the mainstream of the Colorado River itself at a very rapid rate.

In the aftermath, seven persons lost their lives, property damage losses estimated at $30 million were incurred. High releases of water caused major and costly repairs on spillways at Glen Canyon

Dam and the bypass of electrical generating units resulting in the loss of significant generation of power.

At issue is whether each of the involved Federal agencies was employing the best available technology in forecasting and whether prudent management decisions were made based on the data available to them.

Colorado River Forecasting Service is a cooperative effort of six Federal agencies—the National Weather Service, the Bureau of Reclamation, the Geological Survey, the Corps of Engineers, the Western Area Power Administration, and the Soil Conservation Service.

Each of these agencies has a different mission and, therefore, add a different perspective to the forecasting equation.

The National Weather Service indicates it incorporates forecasts made by the Soil Conservation Service for the small headwater streams to compile forecasts for the major rivers. This poses several questions.

Are there a sufficient number of sampling stations in these watersheds?

Are they representative of the snowpack or are there vast wilderness areas with tremendous snowpacks that are not measured directly but only estimated by extrapolation of measurements made adjacent to them?

Do each of the existing sampling stations provide measurements of all parameters necessary to compile accurate projections?

Are the stations interrogated by electronic means, do they require physical observation; that is, are there discontinuities due to sampling methods?

How frequently are they sampled?

Additional questions arise as to the interrelationship between the data gathered and the final result which is how much water can we anticipate will flow down the Colorado River and when will those flows occur?

Because these questions are of such vital importance to so many, because interests on the river are so diverse and because several Federal agencies are involved, an in-depth evaluation made by a qualified independent organization should be undertaken.

This evaluation should focus upon the following questions:

Are snow measurements taken in locations which accurately reflect the conditions on all 112,000 square miles on the Colorado River watershed?

Are all appropriate parameters measured?

Are the data gathered at appropriate time intervals?

Does the computer model consider all appropriate data?

Does the computer model perform its intended task in the best possible manner?

Were the appropriate management decisions rendered considering the data available?

Were high releases made in a timely manner consistent with the information available?

This study, if undertaken, would serve two purposes: First, it would have public credibility because of its independence which no in-house evaluation would enjoy; second, it would develop a validated data base that would enable us to make a determination as to what changes, if any, need to be made in the river's existing operating criteria.

Mr. Chairman, apropos of your opening comments, seems to me we need to inquire as to all of the issues that I have raised and you have raised and to get the scientific data to make those determinations before we can recommend any particular changes either in operating criteria or manner in which this data which is used to project what the revenue—or not the revenue but the river flow forecasts are going to be.

[The prepared statement of Governor Bryan follows:]

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TESTIMONY OF GOVERNOR RICHARD H. BRYAN
BEFORE SUBCOMMITTEE ON INVESTIGATIONS AND OVERSIGHT

THANK YOU, CONGRESSMAN REID, FOR THE OPPORTUNITY TO TESTIFY TODAY.

FROM THE INFORMATION PROVIDED BY THE AGENCIES INVOLVED IN MONITORING PRECIPITATION, SNOW PACK, WEATHER AND RIVER FLOWS ALONG THE COLORADO RIVER, IT APPEARS 1983 HAS BEEN A VERY UNUSUAL YEAR. THERE WERE LATE HEAVY SNOW STORMS OVER THE MOUNTAINS, WHICH PROVIDE WATER TO THE COLORADO RIVER, TEMPERATURES REMAINED UNSEASONABLY LOW LATE INTO THE SEASON AND WERE FOLLOWED BY A RAPID WARMING. THESE UNUSUAL TEMPERATURES COMBINED WITH A HEAVY SNOWPACK, SENT WATER CASCADING INTO THE TRIBUTARIES AND SUBSEQUENTLY INTO THE MAIN STREAM OF THE COLORADO AT A RAPID RATE.

IN THE AFTERMATH, SEVEN PERSONS LOST THEIR LIVES - AND PROPERTY DAMAGE LOSSES ESTIMATED AT $30 MILLION WERE INCURRED. HIGH RELEASES OF WATER CAUSED MAJOR AND COSTLY REPAIRS ON SPILLWAYS AT GLEN CANYON DAM AND THE BYPASS OF ELECTRICAL GENERATING UNITS RESULTING IN THE LOSS OF SIGNIFICANT GENERATION OF POWER. AT ISSUE -- IS WHETHER EACH OF THE INVOLVED FEDERAL AGENCIES WAS EMPLOYING THE BEST AVAILABLE TECHNOLOGY IN FORECASTING -- AND WHETHER PRUDENT MANAGEMENT DECISIONS WERE MADE BASED ON THE DATA AVAILABLE TO THEM.

THE COLORADO RIVER FORECASTING SERVICE IS A COOPERATIVE EFFORT OF SIX FEDERAL AGENCIES: THE NATIONAL WEATHER SERVICE, THE BUREAU OF RECLAMATION, THE GEOLOGICAL SURVEY, THE CORPS OF ENGINEERS, THE WESTERN AREA POWER ADMINISTRATION AND THE SOIL CONSERVATION SERVICE. EACH OF THESE AGENCIES HAS A DIFFERENT MISSION AND THEREFORE, ADD A DIFFERENT PERSPECTIVE TO THE FORECASTING EQUATION.

THE NATIONAL WEATHER SERVICE INDICATES IT INCORPORATES FORECASTS MADE BY THE SOIL CONSERVATION SERVICE FOR THE SMALL HEADWATER STREAMS TO COMPILE FORECASTS FOR THE MAJOR RIVERS. THIS POSES SEVERAL QUESTIONS. ARE THERE A SUFFICIENT NUMBER OF SAMPLING STATIONS IN THESE WATER SHEDS? ARE THEY REPRESENTATIVE OF THE SNOW PACK OR ARE THERE VAST WILDERNESS AREAS WITH TREMENDOUS SNOW PACKS THAT ARE NOT MEASURED DIRECTLY, ONLY ESTIMATED BY EXTRAPOLATION OF MEASUREMENTS MADE ADJACENT TO THEM? DO EACH OF THE EXISTING SAMPLING STATIONS PROVIDE MEASUREMENTS OF ALL PARAMETERS NECESSARY TO COMPILE ACCURATE PROJECTIONS? ARE THESE STATIONS INTERROGATED BY ELECTRONIC MEANS, OR DO THEY REQUIRE PHYSICAL OBSERVATION, I.E., ARE THEIR DISCONTINUITIES DUE TO SAMPLING METHODS? HOW FREQUENTLY ARE THEY SAMPLED? ADDITIONAL QUESTIONS ARISE AS TO THE INTERRELATIONSHIP BETWEEN THE DATA GATHERED AND THE FINAL RESULT -- WHICH IS HOW MUCH WATER CAN WE ANTICIPATE WILL FLOW DOWN THE COLORADO RIVER AND WHEN WILL THOSE FLOWS OCCUR.

BECAUSE THESE QUESTIONS ARE OF SUCH VITAL IMPORTANCE TO SO MANY, BECAUSE INTERESTS ON THE RIVER ARE SO DIVERSE, AND BECAUSE SEVERAL FEDERAL AGENCIES ARE INVOLVED, AN IN-DEPTH EVALUATION MADE BY A QUALIFIED INDEPENDENT ORGANIZATION SHOULD BE UNDERTAKEN. THIS EVALUATION SHOULD INCLUDE ANSWERS TO THE FOLLOWING QUESTIONS:

1. ARE SNOW MEASUREMENTS TAKEN IN LOCATIONS WHICH ACCURATELY REFLECT THE CONDITIONS ON ALL 112,000 SQUARE MILES ON THE COLORADO RIVER WATERSHED?
2. ARE ALL APPROPRIATE PARAMETERS MEASURED?
3. ARE THE DATA GATHERED AT APPROPRIATE TIME INTERVALS?
4. DOES THE COMPUTER MODEL CONSIDER ALL APPROPRIATE DATA?
5. DOES THE COMPUTER MODEL PERFORM THE INTENDED TASK IN THE BEST POSSIBLE MANNER?
6. WERE THE APPROPRIATE MANAGEMENT DECISIONS RENDERED CONSIDERING THE DATA AVAILABLE?
7. WERE HIGH RELEASES MADE IN A TIMELY MANNER CONSISTENT WITH THE INFORMATION AVAILABLE?

THIS STUDY WOULD SERVE TWO PURPOSES: FIRST IT WOULD HAVE PUBLIC CREDIBILITY, BECAUSE OF ITS INDEPENDENCE, THAT NO IN HOUSE EVALUATION WOULD ENJOY; SECOND, IT WOULD DEVELOP A VALIDATED DATA BASE THAT WOULD ENABLE US TO MAKE A DETERMINATION AS TO WHAT CHANGES, IF ANY, NEED TO BE MADE IN THE RIVER'S XISTING OPERATING CRITERIA.

Mr. REID. Governor Bryan, we do have some questions of you and certainly in that we will get into some technical matters. If you would like to have Mr. Stonehocker come forward, that would be fine.

Governor BRYAN. Yes; Mr. Stonehocker, as you know, is with the Colorado River Commission and he is our chief executive officer and he can certainly respond to any questions that you may have on a technical basis.

Mr. REID. Mr. Stonehocker, would you spell your name for the record, please?

Mr. STONEHOCKER. S-t-o-n-e-h-o-c-k-e-r.

Mr. REID. Governor Bryan, would you relate, and perhaps Mr. Stonehocker, as to the Bureau of Reclamation's keeping you informed after the flooding had started.

Governor BRYAN. I think there are two aspects of that. I would refer to Mr. Stonehocker with respect to the information flow that was provided to the Colorado River Commission from the Bureau.

The other aspect, Mr. Chairman, I was not aware of your question prior to coming here this morning, but I can certainly provide that information.

There is, as you know, at the State level, emergency planning agencies which have a role comparable to that of their counterpart at the Federal level. The lines of communication, as I understand, were manyfold. Mr. Stonehocker can certainly address the manner in which the Bureau kept him and his staff informed.

I could make available to you by testimony or by written——

Mr. REID. Would you do that?

Governor BRYAN [continuing]. The information that would have to be made available by Mr. Bob Andrews.

Mr. REID. Fine.

Mr. Stonehocker.

Mr. STONEHOCKER. Concerning the Colorado River Commission's advisement, I think it was very adequate, the flexibility. The Bureau was very proficient in keeping us informed as to what those outflows were to be and also what the projected——

Mr. REID. Move the microphone a little closer.

Mr. STONEHOCKER [continuing]. Also concerning the projections of generation out of Hoover and Lake Powell.

Mr. REID. Governor Babbitt of Arizona has suggested that one of the things we should look at is setting up a Colorado River Commission to be a little different than it is now, so that decisions could be made in a less political atmosphere. Do you feel that something like that would be helpful, or do you have any feelings on that?

Governor BRYAN. I met with Governor Babbitt several months ago and he talked in very general terms about that proposal, Mr. Chairman. I have not seen sufficient data at this time that I would be prepared to commit myself to that, but I certainly will go to take a look at what his proposals were. And we would respond to them.

Mr. REID. One of the things that we would like—if you are going to submit some written materials to us anyway—if you would have your staff contact Governor Babbitt, find out what the details would be of his proposal, and then in writing give us indication what would be acceptable to you.

Governor **Bryan**. We would be happy to, Mr. Chairman.

Mr. **Reid**. Congressman McCandless.

Mr. **McCandless** [inaudible].

Governor **Bryan**. With all of the students in the gymnasium this morning, Congressman, they are going to think that their elected officials have the world's poorest posture.

Mr. **McCandless**. As we said earlier, this gymnasium was designed for basketball games and not congressional hearings.

I would only mention in passing that my position, as far as being seated here, does not represent my philosophy. I would be at the other side here, far right. I haven't chosen my seat here this morning. The chairman says he wants to monitor my attitude.

Things I am concerned about and the reason we are having these hearings this morning and the one in Yuma and one in Needles—[inaudible]—having responsibility of the Colorado River—[inaudible]—that there were varied opinions depending upon how you were affected as to how the coordination between the various agencies who had prime responsibility took place.

Would you comment on that? I would be interested in your thoughts as Governor of Nevada as to your feelings about the ability of the various agencies to coordinate their activities, once they found themselves in this kind of position.

Governor **Bryan**. The most appropriate person to answer that would be Mr. Andrews. I can tell you that at the time I was directly involved on a practically hourly basis with him. We in Nevada activated agreements with the National Guard to come down to assist in terms of damage control, and also sent some individuals who are members of the honor camp prison system in the State to assist, particularly in the Laughlin area.

My impression at the time—Mr. Andrews would be the better person to speak—that there was some confusion in terms of what was going to happen on a day-by-day basis after the crisis became manifested. That is, there were all kinds of reports that flows were going to be x volume, y volume, z volume, and that tended to create a lot of confusion.

I am not here at this point to indicate what the genesis of that confusion was, but it was coming to some extent from the Federal agencies. We were getting many, many calls during that timeframe that they were going to be releasing so much tomorrow, and another person would call and say: "No, that is not so, it is going to be less than that." Or somebody else would call and say it is going to be more than that.

That tended to create some confusion frankly, so in that sense it would appear to me that better coordination at that point would have been helpful. I am not suggesting that would have changed the result, but certainly would have been helpful because we were planning based obviously on the information that was made available to us.

Now, this, I emphasize, was after the crises appeared in late June, early July, as I recall. I don't know if that is directly responsive to your question.

Mr. **McCandless**. Yes; it is.

In followup question on that, comments were also made in these areas about the planning process prior to the actual problem, earlier in the year when the statistics were gathered, those statistics then became a basis for administrative determination.

Do you have anything to comment from the State of Nevada's point of view about that period in the time line?

Governor BRYAN. I can share with you candidly an impression that I had at the time, but I think one of the prime purposes that can be served by this committee is to ascertain the facts as they were and then obviously reach harder conclusions based upon the facts.

The impression certainly of a number of constituents of mine in Nevada, and the thing that I think generated a tremendous level of frustration very candidly during the peak periods of crisis also generated a great deal of hostility was in the early months of the year, February and March. Please don't hold me accountable to the precise timeframe, but along the area along Laughlin, the flow was so low that they were not able to operate boats across the river.

I was told by a number of people down there—and the chairman and I were down there at roughly the same timeframe which would have been the 4th of July weekend, as I recall—that literally one could walk across the river at that particular point in the Colorado.

Obviously the question arose, if the flow going down the Colorado shortly before the massive releases occurred at that point, why didn't the releases occur earlier? A number of constituents — I am sure you will probably have testimony today from citizens in our State—certainly posed that question to me. To be very candid, I don't have the answer, but at least that raised the question in my mind whether or not the forecasting criteria is adequate.

Questions that I raised in my testimony: Are there enough sampling stations? Is the time interval that we used to determine and gather this data; for example, there was a good deal of comment made at the time that basically after you reach a certain point, April, mid-April, that not much information is cranked into the computer model.

This year, I think it is fair to acknowledge factually, without question, that we had a very, very late snowfall, that the weather did, as I indicated, remain unseasonably cool late into the year.

I recall in particular that Denver's Stapleton Airport was closed around Eastertime, as I recall. So the question arises as to whether or not, taking all that data into consideration, is that kind of late seasonal occurrence adequately taken into consideration in developing the released flows? I pose that as a question, because I am not prepared analytically to respond.

But those are the kinds of questions and impressions we had in Nevada at that time.

Mr. MCCANDLESS. Thank you, Governor Bryan, for your comments.

Thank you, Mr. Chairman.

Mr. REID. Congressman Dymally?

Mr. DYMALLY. Thank you very much, Mr. Chairman.

First, I want to commend you for bringing this subcommittee to Nevada to focus attention on what is a very serious problem affecting three or more States.

Second, I want to thank the Governor for lending the prestige of his important office on what is a very busy schedule, for coming here today and making these hearings even more credible.

Both FEMA and the Colorado River Commission are of importance to California. In the case of FEMA, this committee has oversight jurisdiction and the full committee, the Committee on Science and Technology, deals with its policy matters annually, and so these hearings will bring back to the committee next year very valuable information, so we can begin to address the problems that FEMA faces and see if we can correct them as a result of these hearings.

I am also pleased to note the number of students here. This is probably, to some of you, the fullest case of practical Government, to understand how the Congress operates. The hearings will take back to Congress very valuable information.

And so, Governor, I am very pleased to see you here. Thank you for coming.

Governor BRYAN. Thank you very much. We are delighted to have your subcommittee, and as you know, the chairman and I have been very close personal friends for a number of years and I am delighted that it was possible for him to chair these meetings this morning.

Mr. REID. Governor, Thank you very much.

Governor BRYAN. Thank you very much, gentlemen.

Mr. REID. Prior to calling the next witness, I recognize in the audience a member of the Nevada State Assembly that represents the Boulder City area and I believe he is here, Jack Jeffery.

The next witness that is going to testify — we had asked Senator Laxalt, the senior Member of the Nevada congressional delegation to testify and he was originally planning to be here. However, because of things that have come up, he has asked his chief administrative assistant Achel Robinson, to read a statement that he has prepared.

Mr. Robinson.

We would ask you to spell your first name for the court reporter. She knows how to spell the last one.

STATEMENT OF ACHEL ROBINSON, CHIEF ADMINISTRATIVE ASSISTANT TO SENATOR PAUL LAXALT OF NEVADA

Mr. ROBINSON. Thank you, Mr. Chairman.

A-c-h-e-l.

Mr. Chairman and members of the committee, thank you for the opportunity to testify on the management of the Colorado River.

Although Nevada's stake in the river is the smallest of the seven basin States, nevertheless, proper management of this vital resource is essential to the growth and economic stability of Nevada.

It is always unfortunate when public officials or private citizens attempt to politicize an already difficult situation for their own personal benefit. The issues surrounding the management of a river that plays so many important roles and affects so many people are extremely complex and often difficult to understand.

But a well-informed public is a necessity if we are to make any change in the river's operations. Not everyone can be happy with the way in which the Colorado River system is operated, but it is important that everyone understands the reasons behind any changes that might be proposed or implemented.

The posturing that has, to too great a degree, gone on over the past few months has done more to raise tempers than it has to raise public awareness.

I think it is important to note that the General Accounting Office, an arm of Congress, has already undertaken a complete review of this year's high water situation along the Colorado River.

I understand that representatives of that office will be testifying at this meeting. I will let their reports speak for themselves. I do, however, find it interesting that GAO has already announced that the high water situation on the Colorado was inevitable.

Damaging flows would have gone down the river no matter what reclamation could have done. For those of you who aren't familiar with past GAO reports on the operations of the river, this in itself is a remarkable statement. In the past, we in the Basin States seemed to think that reclamation was often being used by GAO as a favorite target.

I believe that the hearings of the House Interior Committee also firmly established that reclamation operated the river in full accord with all of the laws it has to consider.

All but one of the States in the Colorado River Basin have come to similar conclusions. But everyone does agree that this has been one of the most unusual water years in the recorded history of the Colorado.

It has been said that history repeats itself. It also has been said that history never repeats itself. Both are about equally true, depending on what we do with the lessons we are supposed to be learning through experience.

The experience of this year would seem to suggest that some changes need to be made in the operations of the Colorado and in the management of the lands which border it. While the House Interior Committee reviews the laws that govern the operations of the river, it is entirely appropriate that your committee look at the technical data which those laws require. The two cannot be separated.

As I said earlier, no one can be entirely happy with the way in which the already overallocated river is managed, but if there is a time to make changes, it is now. The Bureau of Reclamation is conducting meetings with the representatives of the seven Basin States to do just that.

The hearings by the House Interior Committee and this committee also offer a good chance to review the situation and make needed changes while the events of this year still remain fresh in everyone's memories.

If any of the committees find there is a need for change, I would hope that all of the competing interests for river operations, be they agricultural, municipal, flood control, power, recreation, or fish and wildlife, be considered fully before the changes are made. No matter what the change, it will be costly to one group or another.

The challenge that is before us is to insure that the river is operated for the greatest benefit of all. That is no easy task.

The questions to be addressed range from placing weather stations in wilderness areas, to providing insurance.

Ultimately, almost any major change must come before both Houses of Congress for full consideration. Since such changes will be subject to intense scrutiny by Congressmen from throughout the United States, as well as those from within the Basin who are already well aware of the Colorado's erratic history, I would encourage this committee to be as thorough as possible in its investigation, and I offer my full support and cooperation in meeting the legislative goals which might be required.

Thank you very much.

Mr. REID. Ace, please express our appreciation for his participation in these hearings.

Mr. ROBINSON. Thank you very much, sir.

[The prepared statement of Senator Laxalt follows:]

TESTIMONY BY SENATOR PAUL LAXALT
OCTOBER 13, 1983

MR. CHAIRMAN AND MEMBERS OF THE COMMITTEE, THANK YOU FOR THE OPPORTUNITY TO TESTIFY ON THE MANAGEMENT OF THE COLORADO RIVER. ALTHOUGH NEVADA'S STAKE IN THE RIVER IS THE SMALLEST OF THE SEVEN BASIN STATES, NEVERTHELESS PROPER MANAGEMENT OF THIS VITAL RESOURCE IS ESSENTIAL TO THE GROWTH AND ECONOMIC STABILITY OF NEVADA.

IT IS ALWAYS UNFORTUNATE WHEN PUBLIC OFFICIALS OR PRIVATE CITIZENS ATTEMPT TO POLITICIZE AN ALREADY DIFFICULT SITUATION FOR THEIR OWN PERSONAL BENEFIT. THE ISSUES SURROUNDING THE MANAGEMENT OF A RIVER THAT PLAYS SO MANY IMPORTANT ROLES AND AFFECTS SO MANY PEOPLE ARE EXTREMELY COMPLEX AND OFTEN DIFFICULT TO UNDERSTAND. BUT A WELL-INFORMED PUBLIC IS A NECESSITY IF WE ARE TO MAKE ANY CHANGE IN THE RIVER'S OPERATIONS. NOT EVERYONE CAN BE HAPPY WITH THE WAY IN WHICH COLORADO RIVER SYSTEM IS OPERATED, BUT IT IS IMPORTANT THAT EVERYONE UNDERSTANDS THE REASONS BEHIND ANY CHANGES THAT MIGHT BE PROPOSED OR IMPLEMENTED. THE POSTURING THAT HAS, TO TOO GREAT A DEGREE, GONE ON OVER THE PAST FEW MONTHS HAS DONE MORE TO RAISE TEMPERS THAN IT HAS TO RAISE PUBLIC AWARENESS.

I THINK IT IS IMPORTANT TO NOTE THAT THE GENERAL ACCOUNTING OFFICE, AN ARM OF CONGRESS, HAS ALREADY UNDERTAKEN A COMPLETE REVIEW OF THIS YEAR'S HIGH WATER SITUATION ALONG THE COLORADO RIVER. I UNDERSTAND THAT REPRESENTATIVES OF THAT OFFICE WILL TESTIFY AT THIS MEETING. I WILL LET THEIR REPORT SPEAK FOR ITSSELF. I DO, HOWEVER, FIND IT INTERESTING THAT GAO HAS ALREADY ANNOUNCED THAT THE HIGH WATER SITUATION WAS INEVITABLE. DAMAGING FLOWS WOULD HAVE GONE DOWN THE RIVER NO MATTER WHAT RECLAMATION

COULD HAVE DONE. FOR THOSE OF YOU WHO AREN'T FAMILIAR WITH PAST GAO REPORTS ON THE OPERATIONS OF THE RIVER, THIS IS A REMARKABLE STATEMENT. IN THE PAST, THE BASIN STATES SEEMED TO THINK THAT RECLAMATION WAS BEING USED BY GAO AS A FAVORITE TARGET.

I BELIEVE THAT THE HEARINGS OF THE HOUSE INTERIOR COMMITTEE ALSO FIRMLY ESTABLISHED THAT RECLAMATION OPERATED THE RIVER IN FULL ACCORD WITH ALL OF THE LAWS IT HAS TO CONSIDER. ALL BUT ONE OF THE STATES IN THE COLORADO RIVER BASIN HAVE COME TO SIMILAR CONCLUSIONS. BUT EVERYONE DOES AGREE THAT THIS HAS BEEN ONE OF THE MOST UNUSUAL WATER YEARS IN THE RECORDED HISTORY OF THE COLORADO.

IT HAS BEEN SAID THAT HISTORY REPEATS ITSELF. IT HAS ALSO BEEN SAID THAT HISTORY NEVER REPEATS ITSELF. BOTH ARE ABOUT EQUALLY TRUE, DEPENDING ON WHAT WE DO WITH THE LESSONS WE ARE SUPPOSED TO BE LEARNING THROUGH EXPERIENCE. THE EXPERIENCE OF THIS YEAR WOULD SEEM TO SUGGEST THAT SOME CHANGES NEED TO BE MADE IN THE OPERATIONS OF THE COLORADO AND IN THE MANAGEMENT OF THE LANDS WHICH BORDER IT. WHILE THE HOUSE INTERIOR COMMITTEE REVIEWS THE LAWS THAT GOVERN THE OPERATIONS OF THE RIVER, IT IS ENTIRELY APPROPRIATE THAT YOUR COMMITTEE LOOK AT THE TECHNICAL DATA WHICH THOSE LAWS REQUIRE. THE TWO CANNOT BE SEPARATED.

AS I SAID EARLIER, NO ONE CAN BE ENTIRELY HAPPY WITH THE WAY IN WHICH AN ALREADY OVER-ALLOCATED RIVER IS MANAGED, BUT IF THERE IS A TIME TO MAKE CHANGES IT IS NOW. THE BUREAU OF RECLAMATION IS CONDUCTING MEETINGS WITH THE REPRESENTATIVES OF THE SEVEN BASIN STATES TO DO JUST THAT. THE HEARINGS BY THE HOUSE INTERIOR COMMITTEE AND THIS COMMITTEE ALSO OFFER A GOOD CHANCE TO REVIEW THE SITUATION AND MAKE NEEDED CHANGES WHILE THE EVENTS OF THIS YEAR STILL REMAIN FRESH IN PEOPLE'S MEMORIES.

IF ANY OF THE COMMITTEES FIND THERE IS A NEED FOR CHANGE, I WOULD HOPE THAT ALL OF THE COMPETING INTERESTS FOR RIVER OPERATIONS, BE THEY AGRICULTURAL, MUNICIPAL, FLOOD CONTROL, POWER, RECREATION, OR FISH AND WILDLIFE, BE CONSIDERED FULLY BEFORE THE CHANGES ARE MADE. NO MATTER WHAT THE CHANGE, IT WILL BE COSTLY TO ONE GROUP OR ANOTHER. THE CHALLENGE THAT IS BEFORE US IS TO ENSURE THAT THE RIVER IS OPERATED FOR THE GREATEST BENEFIT OF ALL. THAT IS NO EASY TASK. THE QUESTIONS TO BE ADDRESSED RANGE FROM PLACING WEATHER STATIONS IN WILDERNESS AREAS TO PROVIDING INSURANCE. ULTIMATELY, ALMOST ANY MAJOR CHANGE MUST COME BEFORE BOTH HOUSES OF CONGRESS FOR FULL CONSIDERATION. SINCE SUCH CHANGES WILL BE SUBJECT TO INTENSE SCRUTINY BY CONGRESSMEN FROM THROUGHOUT THE UNITED STATES, AS WELL AS THOSE FROM WITHIN THE BASIN WHO ARE ALREADY WELL AWARE OF THE COLORADO'S ERRATIC HISTORY, I WOULD ENCOURAGE THIS COMMITTEE TO BE AS THOROUGH AS POSSIBLE IN ITS INVESTIGATION, AND I OFFER MY FULL SUPPORT AND COOPERATION IN MEETING THE LEGISLATIVE GOALS WHICH MIGHT BE REQUIRED.

Mr. Reid. The next testimony that we are going to hear is a statement which I will read into the record from Tony Coelho. Tony Coelho is the Congressman who represents the Coalinga, Calif. area where the disastrous earthquake took place recently. And out of his congressional district, there are going to be a number of witnesses testifying the next couple of days.

The statement given to me by Tony Coelho is as follows:

Mr. Chairman, I am pleased to have the opportunity to share my thoughts on the subject of Government involvement in natural disaster relief.

My constituents from Coalinga, Calif., know firsthand the devastation and trauma which can be caused by a major disaster, having been struck by an earthquake which measured 6.5 on the Richter scale in early May.

Witnesses from Coalinga will discuss specific problems which they and their fellow citizens encountered so I will not dwell on those; however, there are a few points I would like to raise.

It seems to me that when damage is done by a natural disaster is obviously extensive, some way should be found to expedite the certification process to the President.

Several days now transpire between the date of the disaster and approval by the President and it is important for actual relief efforts and for morale of the area's residents to speed up processing.

Perhaps a minimum threshhold dollar figure could be used as the trigger instead of waiting until firm damage estimates are completed.

Once approval is made and a disaster center is opened, FEMA should have the authority to require those Federal agencies with disaster assistance programs to have representation. As I understand it now, Federal agencies are encouraged to be present, but are not required to participate in a disaster center operation.

In Coalinga's case, my office intervened with the Farmers Home Administration which at first was not going to have its representatives availble in the Coalinga disaster assistance center to help the earthquake victims apply for their emergency loans.

I was able to convince them otherwise, but that should not be necessary.

After the disaster center is operational, most people expect lines and forms to fill out, but they also expect some kind of relief when they reach the end of the lines. Experience in Coalinga has demonstrated, however, that those programs which are designated disaster programs no longer fill that function.

Interest rates for disaster loans, though below market, are too high to afford the kind of relief necessary following a major disaster. Unfortunately, sweeping budget changes forced through Congress in 1981 by President Reagan gutted those programs and left little in the way of genuine help in their place.

Just how little, we are now seeing. In any event, Congress should act to restore the programs to provide true disaster relief.

It may be that what should happen is that those disaster relief programs affecting people, property, and businesses should be concentrated in one agency—in FEMA—instead of being spread out through SBA, FmHA, HUD and others. I do think that disasters affecting agriculture, crops and livestock, should continue to be processed through FmHA because they have the expertise to evaluate those kinds of losses.

It seems to me that FEMA should be the Federal disaster agency and that they should have or obtain the expertise to manage and implement disaster relief programs, not just act as a coordinator with little authority.

I realize that some of these ideas, Mr. Chairman, will require further consideration and study, but I propose them based on problems brought to my attention by Coalinga residents.

I thank you for your willingness to listen and to help and for the opportunity to provide these thoughts.

[The prepared statement of Mr. Coelho follows:]

Statement

of the

Honorable Tony Coelho

Boulder City, Nevada

October 13, 1983

Mr. Chairman, I am pleased to have the opportunity to share my thoughts on the subject of government involvement in natural disaster relief. My constituents from Coalinga, California, know firsthand the devastation and trauma which can be caused by a major disaster, having been struck by an earthquake which measured 6.5 on the Richter scale in early May.

Witnesses from Coalinga will discuss specific problems which they and their fellow citizens encountered; so I will not dwell on those. However, there are a few points I would like to raise.

It seems to me that when damage done by a natural disaster is obviously extensive, some way should be found to expedite the certification process to the President. Several days now transpire between the date of the disaster and approval by the President, and it is important both for actual relief efforts and for morale of the area's residents to speed up processing. Perhaps a minimum threshhold dollar figure could be used as the trigger instead of waiting until firm damage estimates are completed.

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After the disaster center is operational, most people expect lines and forms to fill out, but they also expect some kind of relief when they reach the end of the lines. Experience in Coalinga has demonstrated, however, that those programs which are designated "disaster" programs no longer fill that function. Interest rates for disaster loans, though below market, are too high to afford the kind of relief necessary following a major disaster. Unfortunately sweeping budget changes forced through Congress in 1981 by President Reagan gutted those programs and left little in the way of genuine help in their place. Just how little, we are now seeing. In any event, Congress should act to restore the programs to provide true disaster relief.

It may be that what should happen is that those disaster relief programs affecting people, property and businesses should be concentrated in one agency -- in FEMA -- instead of being spread out through SBA, FmHA, HUD and others. I do think that disasters affecting agriculture (crops and livestock) should continue to be processed through FmHA because they have the expertise to evaluate those kinds of losses. But it seems to me that FEMA should be the federal disaster agency and that they should have or obtain the expertise to manage and implement disaster relief programs, not just act as a coordinator with little authority.

I realize that some of these ideas, Mr. Chairman, will require further consideration and study, but I propose them based on problems brought to my attention by Coalinga residents.

I thank you for your willingness to listen and to help and for the opportunity to provide these thoughts.

Mr. REID. The next witness will be Robert Procaccini of the Community and Economic Division, U.S. General Accounting Office.

Mr. Procaccini.

While all these gentlemen are being seated, I would ask that you identify the witnesses that you have with you and I would also ask those people in the audience—of course, we always appreciate applause, but I think in an effort to expedite these proceedings, if you would hold your applause, we would all appreciate it.

STATEMENTS OF ROBERT PROCACCINI, RESOURCES, COMMUNITY, AND ECONOMIC DEVELOPMENT DIVISION, U.S. GENERAL ACCOUNTING OFFICE, ACCOMPANIED BY CARL BANNERMAN, GENERAL ACCOUNTING OFFICE, RESOURCES, COMMUNITY, AND ECONOMIC DEVELOPMENT DIVISION; STAN FEINSTEIN, ATTORNEY, OFFICE OF GENERAL COUNSEL, GENERAL ACCOUNTING OFFICE; AND JIM LUCKEROTH, EVALUATOR, SEATTLE REGIONAL OFFICE

Mr. REID. Would you continue, please.

First of all, tell us how to pronounce your name.

Mr. PROCACCINI. Thank you, Mr. Chairman. It is Bob Procaccini.

To my immediate right is Carl Bannerman who is also with the General Accounting Office and the Resource, Community, and Economic Development Division, and to my immediate left is Mr. Stan Feinstein, who is an attorney in our Office of General Counsel.

To his immediate left is Mr. Jim Luckeroth who is an evaluator with our Portland suboffice in our Seattle regional office.

Mr. REID. We would appreciate it if you would first explain to us, and of course to the audience, the background of the General Accounting Office and your congressional directive and what you are doing here today.

Mr. PROCACCINI. Fine, sir.

Mr. REID. And you will have to, as Governor Bryan did, continue with the bad posture and lean over so the microphone picks your voice up.

Mr. PROCACCINI. The General Accounting Office is in the legislative branch of the Federal Government. Its headquarters are in Washington, D.C., has 10 regional offices across the United States.

Prime mandate of the General Accounting Office is to assist Congress in evaluating Federal programs, how economically, efficiently and effectively they are operating and to recommend to Congress ways of improving those programs.

Mr. Chairman and members of the subcommittee——

Mr. REID. One last interruption and I will leave you alone. We have your written statement. You could proceed through the statement or summarize, leaving us more time for questions.

Mr. PROCACCINI. Let me briefly summarize the statement for you, Mr. Chairman.

Mr. DYMALLY. Mr. Procaccini, are you from the regional office or from Washington?

Mr. PROCACCINI. No, Congressman. Mr. Bannerman and myself and Mr. Feinstein are from Washington, D.C., and Mr. Luckeroth is from the Portland office.

Mr. DYMALLY. Thank you.

Mr. PROCACCINI. Concerned about the flood damages that occurred this past summer, the chairmen of the House Subcommittee on Environment, Energy and Natural Resources, Committee on Government Operations and the House Committee on Interior and Insular Affairs, and eight other Congressmen—including yourself, Mr. Chairman, and Congressman McCandless—asked GAO in late July to develop information on events that led to this summer's flooding and the operating criteria followed by the Bureau in determining the amount of water to be released from its reservoirs.

We briefed the committee members in late August and early September on the results of this. To meet the 5-week timeframe established by the requestors, we concentrated on the bureau's implementation of the existing flood control operating criteria including the National Weather Service's streamflow forecasts.

Basically, within the Colorado River system, the Bureau operates 10 major water projects having a combined total storage capacity of nearly 62 million acre-feet. Two of these projects, Glen Canyon in the Upper Basin, and Hoover Dam in the Lower Basin, have a combined storage capacity of over 52 million acre-feet, or about 84 percent of the total space available in the system.

The rapid melting of a higher than normal spring snowpack in the Upper Colorado this year resulted, for the first time in history in filling all of the Bureau's major reservoirs. To manage the flood flows, the Bureau released record amounts of water from some of its largest reservoirs. Some of these releases exceeded the flood damage level of 23,000 cubic feet per second and others exceeded the significant damage level of 28,000 feet per second.

These releases caused flooding in the Lower Colorado Basin and in the Republic of Mexico. Total losses estimated to have occurred from this event total about $80 million. Actual losses remain uncertain because some facilities are still underwater due to continued high water river flows.

The Emergency Management Agency estimated individual losses at about $25 million. Losses to state, county and local governments were also estimated at about $11 million and the Bureau of Reclamation estimated losses to Federal facilities at about $44 million.

Before Hoover Dam was constructed, high flows on the Lower Colorado River occurred frequently and at times exceeded 100,000 cubic feet per second. After 1935, when water storage began in Lake Mead behind Hoover, the mean monthly flows on the Lower Colorado were reduced to 35,000 CFS or less. A further reduction in monthly flows to 20,000 or less occurred after storage in Lake Powell behind Glen Canyon began in 1963. Basically, by filling these reservoirs, water was diverted into storage which otherwise could have resulted in high flows.

The Bureau of Reclamation and the Army Corps of Engineers were aware that once Lake Powell and other smaller upstream reservoirs were filled, streamflows in the Lower Colorado would return to a pattern similar to the one experienced between 1935 and 1963. In fact, the Bureau issued a report in 1976 which pointed this out as well as the probability that flood control releases would have to be made in some years, which would cause damage to developments along the Lower Colorado.

The agencies also reported that the flood control plan for Hoover Dam was based on controlling most floods in the Lower Colorado by making maximum releases of 40,000 CFS, the flow that could be contained within the river channel and the levees; however, development in the floodplain has encroached on the 40,000 floodway and now significant damage occurs at flows of more than 28,000.

The flood control operating plan for Hoover Dam was developed jointly by the Bureau and the corps. Basically, the criteria was designed to require that various minimum amounts of flood storage space be available at certain times of the year and that flood control releases be made from Hoover Dam, if needed, to make space available to store runoff from the annual spring runoff.

In line with the storage place requirement, on August 1, 1982, 7.55 million acre feet of storage space was available as compared to criteria which called for 1.5; 6.5 million acre feet was available on January 1, 1983, as compared to criteria that called for 5.35 million acre feet.

The amount of water released by the Bureau from Hoover Dam was more than the minimum required by the flood control operating criteria during each month from January through May; however, releases in June were less than what was required by the criteria. Forecasts required releases from Hoover Dam in excess of 52,900 cubic feet per second to comply with the flood control operating criteria. After consulting with the corps, the Weather Service, and others, the Bureau decided to take action to restrict downstream flows below Parker Dam to 40,000 CFS or less. The National Weather Service forecasts of monthly inflows into Lake Powell for January through April of 1983 were fairly close to the actual flows that occurred. However, the May 6, 1983 forecast for May inflows was 700,000 acre feet less than actual and the June 7, 1983 forecast for June was only about half of what actually occurred.

To determine if changes in the flood control operations by the Bureau or better inflow forecasts from the Weather Service would have enabled the Bureau to prevent damaging flood control releases, we asked the Bureau to estimate the releases that would have occurred on six hypothetical operating scenarios.

Each scenario has a set of assumptions that were made about such factors as the timing of accurate forecasts and the amount of storage space available in the system.

For five out of the six scenarios, flood control releases in excess of 28,000 CFS would have been required, thus causing damage along the Lower Colorado River. Releases of no more than 28,000 CFS could only have happened if a perfect inflow of forecast was made on January 1, 1983, and the flood control operating criteria were disregarded so that releases could be artificially held to 28,000.

In summary, Mr. Chairman, we have several observations on this summer's flooding.

Some flooding could have been prevented—could not have been prevented given the levels of the reservoirs in January of 1983. This was the case even if the late spring snowfall, melt, and rain runoff could somehow have been anticipated in January 1983. Damaging flood control releases can be expected once every 10 to

15 years, according to Bureau officials, given property development along the river and the flood storage space criteria.

The fundamental questions are whether or not Congress and the people in the States affected should reconsider longstanding operating criteria for managing the river's reservoirs, the plans for the coming year, and the need for closer monitoring of runoff.

The Bureau has met with the Governors of the affected States and I understand is planning additional meetings. It has also asked Congress to review the river's operating criteria and consider plans for the coming year. The National Weather Service is reviewing its forecasting procedures.

Mr. Chairman, this concludes my statement. I would be pleased to respond to any of your questions.

[The prepared statement of Mr. Procaccini follows:]

UNITED STATES GENERAL ACCOUNTING OFFICE
WASHINGTON, D.C. 20548

FOR RELEASE ON DELIVERY
EXPECTED
OCTOBER 13, 1983

STATEMENT OF
ROBERT S. PROCACCINI, SENIOR GROUP DIRECTOR
RESOURCES, COMMUNITY, AND ECONOMIC DEVELOPMENT DIVISION

BEFORE THE
HOUSE SUBCOMMITTEE ON INVESTIGATIONS AND OVERSIGHT
COMMITTEE ON SCIENCE AND TECHNOLOGY
ON THE
1983 FLOODING OF THE
LOWER COLORADO RIVER

Mr. Chairman and Members of the Subcommittee:

We are pleased to be here today to discuss the actions taken by the Bureau of Reclamation this summer in responding to flooding of the Lower Colorado River.

Concerned about the flood damages that occurred, the Chairmen, House Subcommittee on Environment, Energy and Natural Resources, Committee on Government Operations and House Committee on Interior and Insular Affairs and eight other Congressmen--James V. Hansen, Duncan Hunter, Ray Kogovsek, Jerry Lewis, Alfred A. McCandless, Howard C. Nielson, Harry M. Reid, and Bob Stump--asked us in late July to develop information on the events that led to this summer's flooding and the operating criteria followed by the Bureau in determining the amount of water to be released from its reservoirs. We briefed the requestors on the results of our work on August 31 and September 1, 1983.

To meet the 5-week timeframe established by the requestors, we made a limited analysis of the Colorado River flooding.

Mainly, we concentrated on the Bureau's implementation of existing flood control operating criteria including the National Weather Service's streamflow forecasts. We made no evaluation of the federal agencies' performance in fulfilling their responsibilities to the public for disaster relief assistance.

In brief, Mr. Chairman, some flooding could not have been prevented given the amount of storage space available in the reservoirs in January 1983, the minimum amounts of flood control storage space currently required to be available, and property development along the river.

BACKGROUND

Within the Colorado River Basin, the Bureau operates 10 major water projects having a combined storage capacity of nearly 62 million acre-feet.[1] Two of these projects--Glen Canyon Dam in the Upper Basin and Hoover Dam in the Lower Basin--have a combined storage capacity of over 52 million acre-feet, about 84 percent of the total storage space available.

Rapid melting of a higher than normal spring snowpack in the Upper Colorado River Basin this year resulted, for the first time in history, in filling all of the Bureau's major reservoirs in the Colorado River system. To manage the flood flows, the Bureau released record amounts of water from some of its large reservoirs beginning in June. Peak daily releases from Glen Canyon, Hoover, and Parker Dams reached 91,000, 51,000, and 40,000 cubic feet per second (cfs), respectively. This caused flood damage in the Lower

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[1] An acre-foot is the quantity of water required to cover 1 acre to a depth of 1 foot; equal to 325,851 gallons.

Colorado River Basin and the Republic of Mexico. Seven lives were reported lost and property damage and loss of business resulted.

Water releases have now decreased and further decreases are expected. However, high flows are expected to continue until December 1983, at which time, assuming normal precipitation, the flows are expected to drop below the flood damaging level of 23,000 cfs. Significant flood damage begins above 28,000 cfs.

ESTIMATED LOSSES

Federal authorities have estimated losses resulting from the Colorado River flood to total $80 million. A local power authority has estimated about $5.7 million in offsetting revenues from increased power sales. Actual losses remain uncertain because some facilities are still underwater due to continued high river flows.

In late June 1983 the Federal Emergency Management Agency (FEMA) estimated individual losses at about $13 million. These losses occurred mainly to residences and businesses in Topock Marsh and Yuma, Arizona, and the Needles, California, and Parker Strip areas of Arizona and California. In mid-July, FEMA estimated that an additional $12 million in losses to individuals would likely occur to facilities still underwater.

FEMA estimated losses to state, county, and local governments in mid-July at about $11 million. These losses include costs for emergency operations, mosquito control, foregone tax revenues, and losses to public irrigation facilities.

As a result of President Reagan declaring on July 1, 1983, that a major disaster had occurred in Arizona and California, certain counties in those states became eligible for disaster relief assistance. Both individual and public disaster assistance are available as well as flood insurance claim payments, where appropriate. As of September 23, 1983, 861 applications for individual assistance had been received. Of the 861 applications, 622 had been processed--213 were approved and 409 were withdrawn or disapproved. The 213 approved applications totaling $1.2 million included 125 for temporary housing assistance, 54 for unemployment assistance, 27 for Small Business Administration loans, 6 for individual family grants, and one for flood insurance.

The Bureau estimated losses to federal facilities as of August at about $44 million. It included damages to Bureau facilities, such as river bankline protection structures and the spillway tunnels at Glen Canyon Dam, and the loss of stockpiled material.

THE IMPACT OF BUREAU PROJECTS ON STREAMFLOWS

Before Hoover Dam was constructed, high flows on the Lower Colorado River occurred frequently and at times exceeded 100,000 cfs. After 1935 when water storage began in Lake Mead behind Hoover Dam, the mean monthly flows on the Lower Colorado River were reduced to 35,000 cfs or less. A further reduction in the mean monthly flows to 20,000 cfs or less occurred after storage in Lake Powell behind Glen Canyon Dam began in 1963. Basically, by filling these reservoirs, water was diverted into storage that otherwise could have resulted in high flows. In fact, the filling of Lake Powell temporarily eliminated the need for flood control releases at Hoover Dam. The last flood control release from

Hoover Dam prior to this year occurred in April 1958 when an average monthly discharge of about 25,000 cfs was made. However, during the period 1963 to 1980 the reservoir system--most importantly Lake Powell behind Glen Canyon Dam--was filling. Lake Powell was first filled in June 1980.

The Bureau and the U.S. Army Corps of Engineers[2] were aware that once Lake Powell and other smaller upstream reservoirs were filled, streamflows in the Lower Colorado River would return to a pattern similar to the one experienced between 1935 and 1963. The Bureau issued a report in 1976 which pointed this out as well as the probability that flood control releases would have to be made in some years, which would cause damage to developments along the Lower Colorado River. Similarly, the Corps made this point at public meetings in 1979, which discussed Colorado River flood control operations, and in a brochure distributed prior to the meetings.

The agencies also reported that the flood control plan for Hoover Dam was based on controlling most floods on the Lower Colorado River by making maximum releases of 40,000 cfs--the flow that could be contained within the river channel and levees. However, development in the floodplain has encroached on the 40,000 cfs floodway and now significant damage occurs at flows of more than 28,000 cfs. The Bureau and Corps attributed the development in the floodplain to (1) the absence of large flood control releases from Hoover Dam while Lake Powell was filling, (2) extensive growth of water based recreation along the river, and (3) lack of adequate land use controls.

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[2] The Corps of Engineers has responsibilities for developing flood control operating plans, including flood control operating criteria.

BUREAU IMPLEMENTATION OF FLOOD CONTROL OPERATING CRITERIA

The flood control operating plan for Hoover Dam was developed jointly by the Bureau and the Corps. Basically, the criteria was designed to require that (1) various minimum amounts of flood storage space be available at certain times and (2) flood control releases be made from Hoover Dam, if needed, to make space available to store the runoff from the annual spring snow melt.

The minimum storage space requirement ranges from 1.5 million acre-feet (maf) on August 1 of each year to 5.35 maf on January 1. The criteria requires that at least 1.5 maf be available at all times to control runoff from a sudden large rainfall. The space requirement gradually increases after August 1 to at least 5.35 maf on January 1 to provide space to control runoff from the annual spring snow melt. In line with the storage space requirement, on August 1, 1982, 7.55 maf of storage space was available and 6.50 maf was available on January 1, 1983.

The amount of flood control releases needed to comply with the minimum requirement is determined by the Bureau from a mathematical formula contained in the flood control operating criteria. The formula determines how much water will have to be released from Lake Mead each month considering the forecasted inflows, space available, and need to have a minimum of 1.5 maf of space available at all times. Forecasts of the inflow to Glen Canyon, Hoover, and other projects are received by the Bureau each month from January to July from the National Weather Service's Colorado Basin River Forecast Center.

The amount of water actually released by the Bureau from Hoover Dam was more than the minimum required by the flood control operating criteria during each month from January through May. However, in June releases were less than what was required by the criteria. In June inflow forecasts increased greatly, ranging from 131 percent of average on June 7 to 210 percent on June 28. Such forecasts would have required releases from Hoover Dam in excess of 52,900 cfs to comply with the flood control operating criteria. After consulting with the Corps, the Weather Service, and others, the Bureau decided to take actions to restrict the downstream flows below Parker Dam to 40,000 cfs or less if possible (the historic nondamaging floodway), even though the criteria called for higher releases. While the Bureau has been successful in limiting releases to about 40,000 cfs, it has had to use the 1.5 maf of storage required to be available at all times.

NATIONAL WEATHER SERVICE FORECASTS

The National Weather Service forecasts of monthly inflows into Lake Powell for January through April 1983 were fairly close to the actual amounts of inflow that occurred. However, the May 6, 1983, forecast for May inflow was 700,000 acre-feet less than the actual inflow and the June 7, 1983, forecast for June was only about half of what actually occurred (about 3.5 maf forecasted as compared to an actual inflow of about 6.7 maf).

Officials of the Weather Service's Colorado Basin River Forecast Center identified several factors contributing to these forecasting difficulties.

- --The snowpack continued to increase during April and May. Normally, snowpack is at its highest level on April 1, and there is limited snowpack sampling after that date.
- --Above average temperatures in late May and early June rapidly melted the snow.
- --Normal snow melt runoff losses to evaporation and infiltration into the soil apparently did not occur during the May and early June melt period.
- --A large rainstorm in mid-June may have contributed as much as 2 million acre-feet to the runoff.

Because of the forecasting difficulties, officials of the Colorado Basin River Forecast Center are examining their forecasting methods and practices to determine what improvements can be made to the data base and procedures. However, because current procedures have produced relatively accurate past forecasts, these officials believe they should proceed carefully in making changes to them.

HYPOTHETICAL OPERATING SCENARIOS FOR 1983 FLOOD FLOWS

To determine if changes in flood control operations by the Bureau or better inflow forecasts from the Weather Service would have enabled the Bureau to prevent damaging flood control releases, we asked the Bureau to estimate the releases that would have occurred under six hypothetical operating scenarios. The attachment describes the assumptions made for each scenario and the projected releases that would have been made based on those assumptions.

For each scenario a different set of assumptions was made about such factors as the timing of accurate forecasts and the amount of storage space available. While these scenarios provide some insight into whether damage caused by the flood could have been prevented, most of them assume the Weather Service could have accurately predicted the meteorological events which caused the heavy runoff months before such events occurred.

For 5 of the 6 scenarios flood control releases in excess of 28,000 cfs would have been required, thus causing damage along the Lower Colorado River. Releases of no more than 28,000 cfs could only have happened if a perfect inflow forecast was made on January 1, 1983, and the flood control operating criteria were disregarded so that releases could be artificially held to 28,000 cfs from February through October.

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In summary, Mr. Chairman, we have several observations on the flooding in the Lower Colorado River.

--Some flooding could not have been prevented given the levels of the reservoirs in January 1983. This is the case even if the late spring snowfall, melt, and rain runoff could somehow have been anticipated in January 1983.

--High flow levels will continue through November of this year, but increases in the rate of water releases are not expected barring above normal precipitation.

--Damaging flood control releases can be expected once every 10 to 15 years, according to Corps and Bureau officials, given current property development along the river and flood control storage space criteria.

--Fundamental questions are whether the Congress and the people in the states affected should reconsider (1) the longstanding operating criteria for managing the river's reservoirs, (2) plans for the coming year, and (3) the need for closer monitoring of runoff. The Bureau has met with the governors of the seven affected states and planned additional meetings. It also has asked the Congress to review the river's operating criteria and consider plans for the coming year. The National Weather Service is reviewing its forecasting procedures.

Mr. Chairman, this concludes my statement. We will be pleased to respond to your questions.

SCENARIO ASSUMPTIONS

For each scenario on the next page, the following assumptions were made.

Scenario

1--Assumes 19,000 cfs releases for January, February, and March, then releases required under the flood control operating criteria based on a perfect forecast on April 1.

2--Assumes actual releases made through March, then releases required under the flood control operating criteria based on a perfect forecast on April 1.

3--Assumes 7.5 maf of storage available on January 1, 1983; unchanged forecasts of inflow for January, February, and March, which determine releases for these months; and a perfect forecast on April 1.

4--Assumes receipt of an inflow forecast of 13.3 maf on June 1 rather than June 21, 1983, as was actually received by the Bureau.

5--Shows the time necessary to dissipate the 1983 flood waters if releases were held to 28,000 cfs and 5.35 maf of storage space were to be attained on January 1, 1984. This scenario also assumes a perfect forecast on January 1, 1983, and does not consider the flood control operating criteria.

6--Assumes receipt of a perfect forecast on January 1, 1983, for the entire flood period.

ATTACHMENT

ATTACHMENT

HOOVER DAM RELEASES UNDER SIX HYPOTHETICAL OPERATING SCENARIOS
(in thousands of cfs)

Date	Actual or as projected release[a]	SCENARIOS					
		1	2	3	4	5	6
1982							
Nov.	6.4	6.4	6.4	15.4	6.4	6.4	6.4
Dec.	7.5	7.5	7.5	16.5	7.5	7.5	7.5
1983							
Jan.	19.1	19.0	19.1	7.1	19.1	18.6	35.0
Feb.	6.6	19.0	6.6	10.2	6.6	28.0	35.0
Mar.	10.3	19.0	10.3	19.0	10.3	28.0	28.0
Apr.	17.8	40.0	40.0	40.0	17.8	28.0	28.0
May	19.8	35.0	40.0	35.0	19.8	28.0	23.3
June	31.7	32.6	40.0	35.0	60.7	28.0	23.5
Jul.	41.9	21.9	33.0	23.4	64.6	28.0	16.3
Aug.	41.3	33.5	30.7	38.7	25.4	28.0	33.1
Sept.	39.1	28.3	26.6	37.2	27.0	28.0	28.4
Oct.	39.1	25.9	25.9	34.3	25.9	28.0	25.9
Nov.	27.2	23.4	23.4	31.6	23.4	27.5	23.5
Dec.	21.9	21.9	21.8	29.6	21.8	21.9	23.9

[a] Represents actual flows through mid-August 1983 and projections thereafter based on existing water levels and average weather events throughout the calendar year.

Data prepared by: Bureau of Reclamation, Lower Colorado Region, August 22,1983.

Mr. REID. One of the interesting things I noticed in your statement is that one of the reasons that we probably haven't had problems in recent years is that Lake Powell has taken about 17 years to fill up; isn't that right, since it was constructed?

So there has been a continual filling process of Lake Powell?

Mr. PROCACCINI. Yes. That is correct, Mr. Chairman.

Mr. REID. Now that it's full and has been for approximately 3 years since 1980, is that true?

Mr. PROCACCINI. Yes; that is correct, Mr. Chairman.

Mr. REID. So one of the reasons that this is a fairly new phenomenon is because the dam is now full?

Mr. PROCACCINI. Yes.

Mr. Chairman, I think if we look at this picture historically, historically we have had a system where storage space has been available to meet any kind of a contingent type of event, and the storage space has filled over the years, that insurance policy if you want to call it that, has become less and less valuable.

The margin for error, the margin for operation has shrunk because of the filling of the reservoirs which has implications for future operations.

Mr. REID. You have indicated in your conclusion that there are some fundamental considerations that Congressmen consider in operating the river. I am wondering if you could elaborate on that or one of your staff people could.

Mr. PROCACCINI. The fundamental questions, Mr. Chairman, raised by our work are whether the States affected and the Congress should consider the need for closer monitoring of runoff. In addition, whether or not the operating criteria for managing the reservoirs should be reconsidered.

What I am talking about specifically in terms of the operating criteria is the amount of storage space that is dedicated to flood control. The current conflict which exists between property development along the river on one hand and a flood control operating plain which is based on a 40,000-cubic-feet-per-second release.

These are difficult questions to resolve, difficult paths to undertake. They must consider a multitude of interests from the different water users, the different interests of the States involved, as well as future impacts of what is going to happen in the system in the future in terms of the central Arizona project.

Mr. REID. But it would appear from the testimony that you have given that these are some of the tough questions that must be broached, because if we don't start asking some of these questions we are going to continually have problems; is that not true?

Mr. PROCACCINI. I believe so, Mr. Chairman.

Mr. REID. Mr. McCandless?

Mr. MCCANDLESS. Thank you, Mr. Chairman.

I would like to go back to the audit process. As I understand your responsibility in this matter before us, the title which you have here is senior group director, Resources, Community, and Economic Development.

In the process of your administrative audit, did you get involved with the land use and those decisions that had been made by county and local government along the river that were affected by the river overflow?

Mr. PROCACCINI. No, Congressman, not on this particular issue. The primary interests of the requestors of this work was to look into the events that led up to the flooding along the Colorado River this year as well as to the extent the Bureau complied with flood control operating criteria.

They asked us to do this work in a very short timeframe—5 weeks—and get back a report. We simply did not have the time to get into those type of issues.

Mr. MCCANDLESS. I believe it was Governor Babbitt in Yuma that suggested that we might have too many cooks in the kitchens stirring the broth at the same time, and as a result the broth didn't get to the table in the manner it was designed to do with respect to the primary agencies responsible and their coordination.

In your research into the subject, did you find that to be a problem or whether third influences beyond those that could be managed by the primary agencies involved in the river plan?

Mr. PROCACCINI. That is also a question, Congressman, that we really did not look at in this particular assignment. I can understand the premise for that type of concern. We have the FEMA agency as such.

The disaster relief actually provided involves a total of six other agencies. Whenever you have six different groups of people involved in providing assistance, the potential problems of a coordination nature could exist.

On this particular assignment, to my knowledge, on no other assignments has GAO looked into that particular problem, but I can make inquiries to see whether or not we have done work in the past on this issue and supply that information for you.

Mr. MCCANDLESS. Now you understand I want to separate out before the fact and after the fact. The Bureau of Reclamation, Corps of Engineers, Geographic Survey, National Weather Service would probably be the three main, four main agencies involved on a day-to-day basis that would coordinate their responsibilities for the operation of the river. And I wanted to leave out FEMA and the others who would come in as a result of the problems we have experienced.

Would your answer to that question still be as you have stated it?

Mr. PROCACCINI. In terms of coordination between the corps and the Bureau, I think the work we did here did indicate close coordination between the corps and the Bureau. They were jointly involved in developing the flood control plan for Hoover Dam. They have both been involved in setting, evaluating on a periodic basis that criteria and that condition.

Mr. MCCANDLESS. In your opinion—you made comments to this, but I would like to summarize it as a result of my question.

In your opinion, did the basic agencies follow what had been given them as a criteria for the management of the river by the action Congress took in developing that plan for administrative purposes?

I see you have got Mr. Feinstein involved in that.

Mr. FEINSTEIN. I was just remarking that I thought that the direction of your question was as to whether the agencies in responding to the flood were in accordance with the law of the river, the basic law and the regulations. And if it is, I would be prepared to respond.

Mr. McCandless. You perceived my question accurately.

Mr. Feinstein. From our review of the laws and the regulations which have application, the corps and the Bureau, in formulating the plan have provided—what the law of the river basically requires is that after the allocation or provision for allocation for water that has to be delivered to Mexico, that the first priority is for flood control.

The plan calls for a dedication of storage space for enough space for 40,000 cubic feet per second and to that extent I think it could be said, and I would say, the plan is in accord with that priority. At the same time, I must say that I think if one were to say that the level of protection should be extended to 28,000 cubic feet per second, then one might have a question as to whether the plan does in effect establish or is in accord with the priority that is mandated for flood control.

Mr. McCandless. There is an old saying—I think I understood what it said—and it goes on like that.

The Bureau of Reclamation you would have to consider is the prime agency of responsibility of the management of the plan; would that be a fair statement?

Mr. Feinstein. Yes, sir, with input from the Corps of Engineers regarding—in regard to the flood control portion of the plan.

Mr. McCandless. Is it your opinion that they discharged their responsibility fully under the law within the framework of your administration?

Mr. Feinstein. I am not trying to avoid the question; I do think that first you must establish what is the appropriate level of flood protection. If in effect the appropriate level is 40,000 cubic feet per second, I think that clearly, in terms of their plans, responded to the priority as mandated.

However, if you establish as a basis the 28,000 cubic feet per second is standard, then I think there would be some doubt as to whether that priority was observed; however, again, I am not trying to avoid the question but the standard of 28,000 cubic feet per second to my knowledge has never been established as one that should be observed by the corps or by the Bureau.

Mr. McCandless. Thank you, gentlemen.

Thank you, Mr. Chairman.

Mr. Durbin. Mr. Procaccini, I listened to your testimony and the response which you gave to Mr. McCandless. Is it my understanding that the GAO has not done an evaluation of the emergency assistance programs that are available from Federal agencies after a national disaster like this one?

Mr. Procaccini. No, Congressman, what I was trying to point out in response to the chairman's question was while we have not assessed the Federal performance, and while we have not assessed Federal performance in responding to this disaster, we have in the past reported on the need for improving delivery of public disaster assistance as opposed to individual disaster assistance.

Mr. Durbin. Let me ask you, I live 2,000 miles away from here and we have had over the last 12 months two floods of our own and I have had plenty of people, not only individuals in businesses but local units of government, contact my office with problems very similar to what we are discussing today.

Have you found any ways we can cut through some of this red tape and get the assistance to the local units of government; for example, more quickly than we are presently doing?

Mr. PROCACCINI. In July 1982, Congressman, we did issue a report entitled "Improved Administration of Federal Public Disaster Assistance Can Reduce Costs and Increase Effectiveness."

Basically, in that report, we did talk about some issues that did get to the redtape-type problem like treating communities inconsistently in determining what an eligible cost is and problems in the delivery of assistance.

The recommendation we made in that particular report and tied into the conclusion that we made was that there was a need for a streamlined system and it was possible that this could be accomplished and achieve the objective of the public disaster assistance as well as permitting State and local applicants to exercise substantially more discretion in establishing priorities and allocating disaster relief funds.

A recommendation we made is currently before Congress being considered. It is part of the disaster relief amendments of 1983, S. 1525. Part of that provision—part of that law or proposed law contains a provision which would allow FEMA to make full grant payments based on estimated cost of repairing damage to the public facilities.

Mr. DURBIN. This is presently pending before the Senate, is that my understanding?

Mr. PROCACCINI. Yes, sir.

Mr. DURBIN. I would expect as a result of this hearing, to take a little closer look at that legislation, to see if there is any minimum legislation in the House that might go along.

I might add that the concern that all of us have that brings us together today are national concerns; concerns of the State of Illinois and State of Nevada. If we can streamline this, get assistance to local units of governments, individuals and businesses more quickly, I think we would have done a greater service.

This will be the first time I have spoken.

I thank you, Congressman Harry Reid, and assure everyone in the audience the Congressman is doing a good job making sure we in the Midwest appreciate the problem you face.

Thank you.

Mr. REID. Congressman Dymally?

Mr. DYMALLY. Thank you, Mr. Chairman.

I noticed one of the complaints about FEMA is that they take the position they cannot administer aid until the flow of the tide has ebbed. In the meantime, the counties need some aid, immediate aid.

What if this situation continues for a long time? How is that dilemma going to be resolved?

Mr. PROCACCINI. The 1982 report I was referring to, Mr. Congressman, did not specifically identify that as a particular problem inherent in the FEMA program; however, the conclusions reached and the legislation pending before the Congress in essence makes a grant payment based on estimate of cost.

As I understand the philosophy behind that system, it is basically that quick estimates are made of damages, quick negotiations are made with and concluded with State and local governments. Grant payments are made, the money is then turned over to the States for their administration as they see fit. And that subsequent to the disaster there is then a postevaluation comparability oversight-type process once the disaster is finished.

That kind of philosophy would permit the legislation—I think will go a long way to helping the kind of problems you have identified.

Mr. DYMALLY. Hopefully that will be addressed in the new bill that would streamline the agency.

Mr. PROCACCINI. This particular bill, as I understand it, is disaster relief amendments for 1983.

Mr. DYMALLY. Thank you very much.

Mr. REID. Carrying on Mr. Dymally's line of questioning, you know, there are some who say that we are in a catch-22 position, especially when we look at what is happening along the Colorado.

In effect—and we were told this in Arizona and California when we held the hearings there—that they really couldn't make a final decision—they being FEMA—until the flood had subsided and the water is still flooding.

Therefore, the people are still waiting around and the counties, for example, that are involved, they need assistance now but are being told they can't until a final determination is made as to the amount of damage. And that can't be done until the flooding stops.

Now, have you addressed that in any of your investigations?

Mr. PROCACCINI. No; we have not, Mr. Chairman, with regard to the individual disaster assistance loans. The 1982 report I referred to previously dealt with public disaster assistance provided the State, local, and county governments.

Mr. REID. If I could interrupt while it is on my mind, it would seem though that we have this legislation before our committee, it would seem very appropriate if you would look at that closely based upon the questions Congressman Dymally and I have, and give the committee some ideas as to what could be done to cover that problem, because those of us who have had experience in local government can really appreciate the problems that those people are having down along that river, those governmental agencies.

Would you look at it in that regard and render in writing to our committee some suggestions for changes in that regard?

Mr. PROCACCINI. We can certainly take a look at past work we have done in individual disaster assistance and bring to your attention any ideas based on that past work that we think might be useful to you in considering this legislation.

Mr. REID. There are some—oh, Congressman McCandless, who I think has some questions—I would like to ask just one more.

Even though you have stated, in effect, the Bureau of Reclamation did what they could do and that some flooding was inevitable, in the statement that you make some flooding was inevitable, it is clear, is it not, that the extent of the flooding could have been lessened if some different information had been given to the Bureau earlier on, so that they wouldn't have had to release so much water when they did and could have started releasing it earlier, because it is commonsense if you release 10 gallons of water, it is going to do more damage than 5 gallons?

Mr. PROCACCINI. I believe that is generally correct, Congressman. I would make this kind of caution about those scenarios: The purpose of those scenarios was not to determine if large flows could have been cut down in size or duration.

Rather, the purpose was to determine if changes in flood control operations or better flow forecasts would have enabled the Bureau to prevent damaging flood control releases, to see what kind of an insight running those scenarios would give us to the problem.

The observation we made based on that was that some flooding could not have been prevented given the levels of the reservoirs in January of 1983. While the flood damage—while perhaps less flood damage would have occurred at lower levels or shorter duration, these scenarios are based on assumptions that if you look closely at them, I think most people would agree they are not reasonable.

It is not reasonable to assume that the Weather Service could have made perfect weather forecast in January.

Mr. REID. But the Weather Bureau itself told us in our hearings that we held that they—and I don't think I am paraphrasing very much—that they blew it. They stopped measuring the snowpack. They stopped doing a lot of things that could have given the Bureau more information.

Certainly logic dictates that that would have lessened the damage all along the river had they warned the Bureau earlier that there would be a lot of water up there that they didn't expect?

Mr. PROCACCINI. No doubt better information or timely information may have helped the situation. I think the point we were trying to make is we still would have had significant flood damage even if accurate information was provided as soon as possible.

Mr. REID. And, of course, the people who are concerned about the monetary losses they have had with the recreational properties, if we had started the releases earlier because the Weather Bureau had told the Bureau they could earlier, it would have allowed some of these people to have some of their most profitable year when the river could have been down somewhat; isn't that true?

Mr. PROCACCINI. How far in advance even with improved system of forecast, even if some of the problems pointed out by previous witnesses: The absence of snow samplings after April 1, the fewer stations, the need for more stations, need for more real-time measures that, even if those kinds of improvements were incorporated into the system, at what point in time would enable the Weather Service to give an accurate projection of this year's events?

I really have no idea. Whether it could have been as early as January, I don't know.

Mr. REID. But again, and perhaps repeating myself, it is clear that if the Bureau of Reclamation received information from the Weather Service, this water condition in the mountains, et cetera, it would have started releasing water sooner and there would have been less damage?

That is commonsense, isn't it?

Mr. PROCACCINI. I believe so, yes, sir.

Mr. REID. Congressman McCandless, did you have some questions?

Mr. McCandless. Yes, Mr. Chairman.

Getting back to the FEMA aspect, the line requests that originate from local government, having had some experience in Riverside County and the procedure, there first must be a finding by local government; that then is forwarded to the State Governor's office, then the Governor must make a finding and petition the President who, in turn, must make a finding before FEMA can begin to function.

Am I creating the correct——

Mr. Procaccini. I believe that is right, Congressman.

Mr. McCandless. Did you, in the process of your review, do any of the investigating or reviewing of that time line between the various agencies which is necessary before the Federal Government can act, separate from what the action of the Federal Government might be?

Mr. Procaccini. No, Congressman, that was not part of the work we did.

Mr. McCandless. I mention that only in passing, Mr. Chairman, because sometimes it has been my experience that a State government must do an audit itself to determine whether the level of damages is great enough before they will suggest to the Governor that he petition the Federal Government.

I am not saying that was or was not the case, but we are talking about an administrative procedure that might need to be reviewed in some way or another to speed up the time line between the action involved and the aid that would be available.

Mr. Reid. I appreciate that.

Mr. McCandless. Thank you.

Mr. Reid. Gentlemen, thank you very much for your testimony.

Mr. Procaccini. Thank you, Mr. Chairman.

Mr. Reid. The next witness we are going to have is George Charchalis.

As Mr. Charchalis is coming to the witness stand, I would briefly indicate that Mr. Charchalis has formerly been the city manager in Clark County and has worked for a number of the local entities, and has been a professor of planning at the University of Arizona. He is now a private consultant in the planning field.

Mr. Charchalis, if you would be kind enough to summarize your testimony because I am sure, based upon the statement that we have from you, we have a lot of questions.

STATEMENT OF GEORGE CHARCHALIS, PLANNING CONSULTANT, RENO, NEV.

Mr. Charchalis. When I looked at the list of witnesses listing me as a planning consultant from Reno—and I understand the definition of an expert is somebody from out of town—I might say that I spent 12 years in southern Nevada in local government, one of which was to serve with Congressman Reid, the city of Henderson, Nev., when he was city attorney and I was city manager. So I have had an involvement in local government and currently maintain an office in southern Nevada.

Mr. Reid. You will have to bring the microphone down a little bit.

Mr. Charchalis. I really thought the books were a function of scenario planning that we have reached.

Can you hear me now?

Mr. Reid. Just pull it a little closer.

Mr. Charchalis. As I was going over my testimony, to summarize that, I remember an occasion—to some extent I am going to paraphrase it but it is something like this, the problems of significance go through several phases, probably five plateaus.

First, there is a body of experts whose job it is to study the problem looking at it.

Second phase is when they try to focus public attention on the problem, and then the third stage is when there is some catastrophe or some dramatic occurrence which galvanizes public attention, focuses their attention on the problem.

The next phase is when there is a heightened sensitivity of public involvement in trying to deal with it. The final phase, of course, is when the public's attention wanes and goes to other problems and the same body of experts is left to deal with the problem.

To some extent, I think that would apply to the question we have here, because the Colorado River has flooded historically, and with the construction of Hoover Dam, the regulating flooding on the lower Colorado River was rather successful.

However, in this particular year, we had a number of things that seemed to converge which mitigated against a leisurely solution to the problem.

First of all, as previously mentioned, you have had a situation where the reservoirs were full. Second, you had an extremely large snowpack that went—and precipitation went into the stream.

Finally, you had a payment-in-kind program with the Federal Government, gave to farmers grain in favor of them taking crops out of production, and that probably led to the withdrawal of maybe 25 to 30 percent of the farmland in the Imperial Valley from production which meant that there was a lessening in the amount of water needed for irrigation there.

In addition to that, a generator was taken out of service at Hoover Dam and a number of things occurred so that there was a situation developed where there was very little room for leeway.

What we ended up with is a problem that requires not only adequate planning for the hydraulics of the river itself, which leads to the need for accurate predictions with respect to any of the natural and manmade phenomena that might affect the river, and also a need for the protection for flood plains that are adjacent to the river.

My experience in local government has been that very seldom does local government want to do something that is wrong. Very often, it is because they do not have the kind of sophisticated information that is more available to larger forms of government. But more importantly, very often they are susceptible to special interests.

There are problems with a river that has a course of 340 miles that transverses three States and any number of counties and any number of cities all of whom have to some degree or other purview over the land adjacent to the river.

What I am trying to describe to you is the need for a couple of things: First of all, a better management plan for the river that in particular when the river reaches a capacity, very frankly water is a very precious commodity in the desert and it is very hard for someone to wait to see the water rush through the river and flood out into the Baja, so to conserve this water for use has been a primary concern.

In years when we have had water crises, there has been very little if any attention given to this kind of a problem. We are in one of those cyclical times now when we have converging, a full reservoir, a very wet winter and spring, and the potential for flooding.

We have had testimony previously as to the attempt on the part of certain bureaus to do scenario planning and scenario planning is nothing more than a planner's term for setting down conceivable actions that might occur given any circumstances that might arise, and it is a valuable tool to planners because what it does for them is to say that given a certain set of conceivable circumstances, you can begin to predict what might occur.

Even with that, often there is a disagreement among experts as to how anything might come out. Another planner's term is the planning through the "Delphi Process" which allows for consensus building among experts for diverse opinions.

So what I think needs to be done with respect to the problem we have looked at here is, first of all, there has to be a more careful look at the problem when the river reaches capacity.

In the years when we do not have the problem, those cyclical years when you do not have the heavy snowpacks and the rains you have some time to prepare.

Additionally, you need to have communication between the agencies of the Federal Government that have some purview over the Federal Government and have some capacity to act with respect to what is done.

Finally, there needs to be some strengthening in the way of a plan to allow local government to do better flood plain management and planning.

[The prepared statement of Mr. Charchalis follows:]

TESTIMONY

U.S. HOUSE OF REPRESENTATIVES

COMMITTEE ON SCIENCE and TEHNOLOGY

SUBCOMMITTEE ON INVESTIGATIONS and OVERSIGHT

The HONORABLE ALBERT GORE, JR., Chairman
Chairman
SUBCOMMITTEE ON INVESTIGATIONS and OVERSIGHT

The HONORABLE HARRY M. REID,
Ranking Majority Member
SUBCOMMITTEE ON INVESTIGATIONS and OVERSIGHT

George Charchallis, AICP, ASLA
Landscape Architect & Planner

When Representative Reid called me and asked if I would care to testify at these hearings it was his belief, and I share them, that my chief benefit to the committee might be, not so much in discussing the Scientific and Technical ramifications of this problem because I believe that there will be others to appear before the Committee that will be greatly more qualified than I am to provide you with this kind of information. It was our opinion that I might b e able perhaps to highlight the events that lead up to the flooding this year. What this flooding meant in terms of action that could have been taken to either prevent them or mitigate them and to some extent point the direction towards a better overall river management effort.

It has been said that the Colorado River is the most "engineered river" in the world. There are six dams that control the 340-mile long river system. Over the years has been chained, regulated, and controlled. The river is without a doubt one of the most important natural features to the states that adjoin it. Not only from the great beauty that it has created over the aeons, not only for the recreational and wild life elements that it provides but certainly for its water. Water is the key to growth in the desert and without water the west could not grow. While it is true much of the west's water comes from underground basins, but still rivers like the Colorado and the Truckee River in my own town, provide a great deal of the necessary water to promote a growing economy.

Over the years the Colorado River has historically flooded and changed its course and altered areas. There was navigation on the river up until the construction of Hoover Dam. Boats would routinely come as far north as El Dorado Canyon and some by means of the "Ring Bolts" in the location of Ring Bolt Rapids, would pull themselves through the shallows and go up as far as Callville Bay and the town of Callville itself. This was about the upper limits of navigation on the Colorado River.

The Boulder Canyon Project was initially designed to build a dam in Boulder Canyon about 35 miles from the present position of Hoover Dam. However, it was determined that the rock in this area was comparatively poor for anchoring so massive a project as the dam itself and a new location was selected in Black Canyon where Hoover Dam was ultimately built. Strong volcanic igneous rock, virtually a granite, was located in sufficient formations to permit the construction of what would be the worlds largest dam at that time. The dam was completed in the 30's and upon the filling of Lake Mead in back of the dam, it did a fairly good job of controlling flooding on the lower Colorado River. As demands for more water occurred other dams were built, such as Davis Dam and this provided another regulating basin as well as a source of power generation such as Hoover Dam, when Davis Dam was completed in the 50's.

Along with regulating flooding and the generation of power, the dams provide for the storage of water, and in this case Colorado River provides a great deal of water for the Los Angeles Water District by way of the Colorado Aqueduct. Water is lifted from Lake Havasu by pumping stations and then flows north of Palm Springs through the Banning Pass and into the Metropolitan Los Angeles area. Water for Las Vegas is taken out of Lake Mead and pumped into the Las Vegas Valley by a system of pipes and conduits that were provided for in the southern Nevada Water Project.

One of the things that I should point out at this time is that in addition to the various functions that the river accomplishes, it must do them through a variety of political sub-divisions, a number of states, a larger number of county governments and some cities are adjacent to the Colorado River all of which have some degree of sovereignty over the use of land adjacent to them. Moreover there are a number of Federal Agencies that in some way or other have purview over the river, i.e., the Department of Interior or with its sub-divisions, the Bureau of Land Management and the Bureau of Reclamation, U.S. Army Corps of Engineers, the U.S. Weather Service and others. The Colorado River must obey certain immutable laws of nature such as fluid mechanics, hydraulics, the laws of physics and etc. We have also made the river respond to certain man-made laws or features such as the system of dams and so forth along the river. But in addition to that there are less immutable laws of man that in some ways we ask the river to respond to and this to some extent is what I think is most vexing because it is to a large degree something that could be avoided with the right kind of planning and river management program. Since we know the river has historically flooded and can again, Flood Plain Zoning is one of the less immutable man made laws along with all of the other land use laws established by political subdivisions along the river.

Some of the land adjacent to the river is public domain and is used totally for recreational uses and much of it has been kept in a wilderness state. However, varying degrees of development occur and in some cases in predictable flood plain areas. The Colorado River has historically flooded and has even changed it's course and altered areas over the centuries. Most rivers are subject to flooding, depending upon any series of conditions that might exist. In the case of the Truckee River that runs through Reno, we have had flooding on a number of occasions where the downtown has been inundated and we know that if there is a case where there is heavy snow and an early warm spring, particularly if its accompanied by rain, we will get a rapid melt of the snow pack and the water will run into Lake Tahoe which will then overflow into the Truckee River and the Truckee River capacity within the town will exceed its banks and to the extent that it does exceed the capacity, will flood certain areas. There have been attempts to mitigate this situation and they have been successful but twice during the last year the 14,000 cubic feet capacity of the Truckee River through downtown was almost exceeded. Now in the case of the Colorado River, one that has a 340 mile length, we have a much more complex problem that is occurred because the river flows through a variety of different kinds of geological conditions. Flooding as described in the document FLOOD PLAIN ZONING by the BUREAU OF RECLAMATION 1967 anticipates fairly good control of the river within a maximum flood of 50,000 cubic feet per second. 50,000 second feet is estimated as the equivalent of a 100 year storm in the entire Colorado River Basin as regulated and controlled by the various dams. The current flows have not exceeded 42,000 second feet below Davis Dam. However, they have racked considerable havock in the vicinity of Needles in both California and the Top Rock Marsh Areas of Arizona. The Top Rock Marsh had a dyke that the fish and game people constructed to contain the water in that Wild Life Sanctuary. Unfortunately the dyke wasn't high enough and the gates weren't big enough and the water covered the dyke and as a result there was flooding on properties east of the dyke, and in this particular case there were some homes involved that were in two to three feet of water. But this is what was predicted by the Bureau of Reclamation. However, the Mojave County permit process apparently allowed the construction of homes in what was an articulated flood plain in jeopardy. While officials in Needles anticipated that there would be some minor flooding, they currently have a golf course adjacent to river that was approximately 50% under water, and this golf course is located just north of the downtown.

Additionally some trailer parks and recreational vehicle have the same problem. The crux of the matter is that all of this high water was forcast. River flows between Davis Dam and Yuma forcast for the period 1977 to 1986 predicted a high water level in 1984. It appears that the reservoirs filled up a year sooner than expected and of course there was an unusually large amount of precipitation in April and May of 1983 that was not properly measured by the Weather Bureau. And of course there was the perhaps normal instinct on the part of people dwelling in the desert to conserve water, to save all they could. It is frustrating to see water rushing into the sea that could otherwise be saved for other uses. An additional complication this year was the "Payment In Kind Program" of the Department Agriculture where the Department gives to farmers surplus crops that have been stored from previous years surplusses in return for not planting crops this particular year. Because of this program it has been estimated that at least 20% and perhaps as much as a third of the Imperial Valley of California lay fallow. The result is a significant lessening of use of the Colorado River for irrigation purposes. This lessening of water demand for the Imperial Valley along with the unusually large amount of precipitation in April and May, created a temporary surplus of water in the Colorado River system. The system simply had more water than it could ordinarily hold and flooding occurred.

Another problem is that there is at least an informal agreement that the United States has with Mexico and that is not to let more than 30,000 cubic feet per second of water go through Yuma to the Borellis Dam in Mexico which provides irrigation for the Mexicalli breadbasket of the Baja, California. This agreement means that when irrigation demands drop below approximately 10,000 cubic feet per second, there will be a problem with varying the current 40,000 second feet through Davis Dam and 38,000 second feet through Parker Dam. Parker will have to be held back to perhaps 28,000 cubic feet per second and Davis Dam should probably be dropped down to 31,000 second feet, and Hoover, which is currently discharging at about 36,000 second feet, but should discharge at the rate of 38,000 to 39,000 second feet, will have to drop back accordingly to around 30,000 second feet. This all adds up to a continuing problem because the reservoirs are still above what is desirable for controlling potential floods of 1984. I anticipate that the flows out of Davis Dam will be reduced by about the middle of October to perhaps some 30,000 second feet. I further anticipate that Parker Dam will drop back to about 28,000 second feet, and the flows at Yuma will then be maintained in the vicinity of 20,000 to 27,000 second feet which is within the bracket at which they are presently flowing. If you look at the daily records of the Bureau of Reclamation put out over the 800 number, it specifically gives the inflow into Lake Powell, the elevation of Lake Powell, the flow through Glen Canyon, the elevation of Lake Mead, the flow through Hoover Dam, the elevation of Lake Mojave, the flow through Davis Dam, the elevation of Lake Havasu, the flow through Parker, the flow past Yuma at the Bridge, you get a fairly good idea of what is going on at any particular time. It is interesting, too, in the midst of all of this that one of the generators at Hoover Dam broke down and had to be taken out of service which is the reason that Hoover Dam is only discharging 36,000 second feet instead of the capability of approximately 39 cfs. Because of this the Bureau of Reclamation is consistently lowering the elevation of Lake Mojave and has provided a little breathing room there in case they do get the generator back on line and can start generating even though they may be required to cut the flow at Davis. There is not much storage in either Lake Mojave or Lake Havasu as they are long narrow lakes that are not very deep and they frankly are more of a regulating type of storage for power generation and water diversion to Los Angeles than they are anything of a flood control.

It is very interesting that at Laughlin and Bullhead City the 40,000 second feet flow is now accepted as the norm. This flow doesn't seem to bother anyone there. The Nevada Club is the only one that properties below that level and they have them protected with a wall at the entry. There is some inconvenience on the ramps to various docks for the little ferries that go back and forth between Bullhead City and Laughlin. However, this has not inconvenienced anyone too much and I think perhaps in Bullhead City people have accepted this as how high the river is and there is something to be done when the river level drops. There is a proposed condominium subdivision that has a seawall at elevation 506.0 on the river and the river is at 507.5 at this point. Now they must wait for the river to drop to raise the seawall.

What I've tried to do is describe the process by which the problem along the Colorado River occurred this year. I've tried to indicate that rivers periodically and historically flood just in the natural course of things and once man begins to adjust or "engineer" a river and is not totally aware of all the various ramifications, it can indeed exaserbate a normal situation. If you look at a map of the United States and trace the Colorado River from it's origins through to the Gulf of Baja, you can count the number of states, counties and various local governments that are abutting the river and to some extent have purview over what happens to the river itself and what is done with land that abutts the river. And this may be one of the great complications of the whole problem. While there has been a flood plain zone study done it is very often irresistable for local governments to allow the construction of uses of within a flood plain where the acutarial tables would indicate that this is contrary to the long term well-being of the particular use and the river itself. Of all the various levels of government, from the Federal Government on down, local government is the most susceptible to access by people and accordingly, the most susceptible to pressure to perhaps deviate from broader interests in favor of a particular special interest. While I am not arguing that we must again look to Washington to solve problems of local government, it seems to be that a sound river management plan that did several things would be of salutory benefit to not only the National Government and the various Federal agencies that are involved in the river but would give local government a sound basis upon which to judge their own actions with respect to what is done in the vicinity of the river. It has been my experience over the years in dealing with government both as a local government official and a private consultant that in the main government agencies and officials really wish to make the right decision. Very often the problem is that they are faced with the situation for which either insufficient scientific data exists or conflicting scientific data exists and so they are then faced with the problem of making a decision, more not so much a part of what is really right or wrong but from which direction most of the pressure comes.

Again if you look at the number of federal agencies that have some involvement in the river you can get a significant mosaic of interests, the Department of Interior, the Weather Service, etc., so there needs to be some kind of effort put forth so that first, good sound data can be acquired and this data should be of sufficient depth, both historically and scientifically that reasonable sound predictions can be made into the future, providing for a better way for all kinds of Federal, State and Local agencies to make the right kinds of decisions. I am honestly not clear how this best could be done but it seems to me if the Federal Government can pass legislative acts that give the National Government some degree of sovereignty over the various coastal areas, in my way of thinking there is some similarity, perhaps to a lesser degree, with respect to the various river systems that course throughout the Nation. Each year we are provided on television with graphic pictures of disasterous flooding that has occurred in some part of the country and how this has caused loss of property and life to other degrees relates to other natural phenomena such as tropical storms, etc. While it is impossible, or perhaps not practical, for Local Government, State Government, perhaps even the National Government to prepare a systems to accommodate the worst case scenario for any given natural phenomena, we have learned a great deal about the actuarial aspects of flooding and with some of the new techniques of whether prognostication based upon satalite images, we have a better opportunity to take the right action.

There is a school of thought that says if someone builds in a known flood plain, if someone builds in a mudslide area, if someone builds in an area susceptible to brush or forest fires, and disaster strikes them, then it ought to be on their head. There is some degree of justification in this position. However, government at all level has the obligation to the extent it can, using whatever resources are available, to predict hazard, so that the various zoning and subdivision laws, land development laws, are based upon the soundest kind of information available. We should articulate where seismic risk areas are, we should tell where unstable soil conditions exist, we should indicate where flooding has and can occur, so that there is an interface between the obligation of the local government to legislate for the health, safety, morals and general welfare of the community and infact, the opportunity to avoid building which will in effect jeopardize life and property. As you look at the mosaic of federal, state and local involvement adjacent to the Colorado River, you will quickly come to the realization that they vary greatly in both their philosophy, political make-up, their technical ability, administrative ability, etc. So what I'm suggesting is that an involvement on the part of the Federal Government to coordinate the acquisition of the best possible data available so that it can be mapped, that local governments can be encouraged to withstand pressures that allow for decisions with respect to development that are indeed inimical to the river itself and the health, safety and well being. Furthermore, it appears to me that since actions that relate to the river with respect to how the water is stores, how it is released, where the data comes from, upon which decisions are made, that there ought to be a "clearing house" provided whereby the decisions of one bureau or agency or one local government can be taken into account by all concerned and that the given actions of one agency will be totally understood by everyone involved. I'm speaking simply of something of a better coordinated effort. Frankly, bureaus and agencies tend to think of themselves as independent dutchies and baronetts whereby their actions are independent, or at least single purpose. There charter often doesn't build in systems for broader planning or involvement.

City planning in the United States has had a checkered history. Anyone familiar with the history of city planning knows that it is a democratic kind of planning susceptible to all the vaggaries of public pressure and private pressure, while I subscribe to the system generally, I think it could be strengthened with a better data base. One of the things that troubles me about the environmental movement which is now some two decades old is the bureaucratising of it, and the politicising of the movement. We have added to our ability to judge impacts on the environment substantially in the last twenty years. Often the envrionmentalist feels that the case is so far gone that they must overstate and fight very hard just to keep even with the people who are ravaging the land for private developmental purposes and conversely, the developer feels that they must in no way cooperate with the environmentalist lest they themselves loose ground in this struggle. I think a system could be acquired where the best technical data is arrived at that allows local government to make the decisions which are consistent with broad goals that are in many cases transend the boundaries of local government that may be indeed nationwide or interstate.

In conclusion I ask that the committee look at a management plan for the river that takes into account all the existing conditions. I have previously mentioned that the Colorado River has one of the most "engineered rivers" in the world and that is a fact that must be accounted for in any consideration of the river and it's environs. Furthermore, I ask you to consider an effort that will allow for better coordination among federal agencies that have purview over the river, greater exchanging of data and better communication between agencies with respect to what their actions have been and will be. Furthermore, I believe that a Management Plan that lays out in as concrete terms as possible what the consequences of allowing local government to make decisions with respect to land abutting the river will be and perhaps a system drawing upon scientists available to the various federal agencies in allowing a greater analysis of given actions on the part of local government, would materially improve and strengthen the roll of local government in protecting the river and the land adjacent to it. Again I'm not clear how this could be done. I'm not suggesting all actions be reviewed by agencies of the government but it's clear there are greater resources available to some of the federal bureaus than are available to many of the smaller local governments and I think that that's a resource that could be tapped and indeed should be. Very often when I've had a project that involved a federal agency the response from the agency was often very narrow in scope, relating almost to the mandate that the agency had. For instance, often the Corp of Engineers will look at flood control as the principle issue without respect to asthetics or good design or alternate ways of doing something. And I think that this kind of single mindedness often provides strength to the agency but it gives it a kind myopia that permits very little in the way of inovative solution and very little in the way of sharing information between one federal agency and another, or between federal agencies and local government. Perhaps what I am suggesting in the long run is a type of performance standard.

Mr. REID. Mr. Charchalis, the question that I have, though, is—and your statement gives a lot of legalistic terms, planning terms like zone encroachment and that kind of thing. Tell us in simple terms about just old-fashioned planning up and down the Colorado River Basin.

Could we, the local entities, do a better job of planning up and down that Colorado River Basin?

Mr. CHARCHALIS. Congressman, I think without a doubt all of us could do a better job of planning.

Mr. REID. I guess, is it any worse there than anyplace else?

Mr. CHARCHALIS. I think the problem you run into in a place like the Colorado River is that because it is adjacent to the hydraulics of the river, there is the opportunity of flooding and in the years—in these years when there is hardly any potential for flooding, it is difficult to visualize the idea that this might maybe be under 3 feet of water in 2 or 3 years, and so there is an opportunity to want to develop a really beautiful recreational facility like this.

Mr. REID. How do you feel—because it is in an area where it is along a river and you have so many competing jurisdictions—you have the Park Service and you have the local government entities—I am sure you can imagine many more that are involved in the development of a specific area along the lake or river—does that cause problems? I mean, obviously it does, more so than if you were going to build in other places in Clark County; is that right?

Mr. CHARCHALIS. Certainly. Anywhere you have the potential for national phenomena to occur, whether it is mudslides in California, flooding adjacent to a river, in our river seismic risk is a problem.

Now in the case of seismic risk, we have solved that simply by indicating that in this particular seismic zone you have to have built into the Building Codes certain safeguards, and we have done a better job of that because we have had little or no earthquakes, but in areas adjacent to rivers it is a more complex problem because there are so many vague areas that affect whether or not the river is going to flood.

Mr. REID. Do you think this is an area where Congress could be any help up and down the Colorado River, or do you think we should just stay out of the planning aspect and let the local governments in effect do their own thing?

Mr. CHARCHALIS. In my written testimony, I deal with this point and I am not clear on that myself.

Mr. REID. I note in your written statement the historical prospective that you have put on it.

Mr. CHARCHALIS. In some ways, I guess I am saying we shouldn't run to the Federal Government for everything, but at the same time if you have got a 340-mile river course that crosses three States, any number of counties and so many cities—it is probably the most engineered river in the world—then there needs to be some kind of a current standard that deals with questions that relate to the obligation of local government, the legislature, the health, safety and morals and general welfare of the community.

By that, I mean some way to protect the integrity of the flood plain, the best predictable flood plain.

Mr. REID. Congressman McCandless?

Mr. MCCANDLESS. Thank you, Mr. Chairman.

Having come from local government myself and served through flood control, this is very similar to what we are talking about here. We found that the FEMA—pardon me, the insurance maps, national flood insurance maps, became a very important tool for local government. In fact, if you were to agree to anything in the way of land use other than a flood plan that insurance was not available to the developer. So you were doing both, he and the potential purchasers, a disservice.

This has been a fact of life for some time. Are we not experiencing this along the Colorado River and, therefore, no flood maps for flood insurance that would outline for purposes of those who own the property and those who are purchasing the property what they could and could not do with that property as far as flooding is concerned?

Mr. CHARCHALIS. There are flood insurance maps and the problem you have with that is that they are not always based on the most accurate available information, temporary information.

In addition, if someone wants to go ahead and build on a flood plain, that means they don't get the insurance. But if local government wants to issue a permit for whatever reason, they can go ahead and do it, unless they have adopted their own flood plain zoning which would prohibit it or would require in the way of a performance standard that if you build in the flood plain you build in a protected place—raise the building out of the flood plain or you build diversion dikes above it or something like that.

In my testimony, I am suggesting that it may well be that a performance standard of some kind is the most acceptable way to deal with this particular issue.

Mr. MCCANDLESS. The other part of this is, the map could be very accurate at the time it was produced, but because of residue, because of those things that come with the water in the way of debris flowing up the center of the river, the river has to become wider because it is not as deep and to carry the same amount of water.

Are we equipped along the river as local government to address that kind of situation because it isn't a great length between the accuracy of one map and a few hundred thousand acre feet going down that it begins to come to bear?

Mr. CHARCHALIS. I am having difficulty hearing exactly what you said but I think I got the sense of it, and I am not clear that local government has that capacity.

Mr. MCCANDLESS. Is it your experience if the local government groups do not have that in the planning department that they rely on, is that information available to the resources of some of these management agencies that have responsibility for the management of the river and the river plans?

Mr. CHARCHALIS. I think to some extent it is, but I am not always clear local government knows the right question to ask. Now that is not because they don't want to. It may well be that they just are not equipped to really perceive that as a problem.

Another thing that I should point out to you, that one of the problems we run into when we have got a complex water course like this and a number of Federal agencies that are involved in its management, very often they are out there for a single purpose.

They look at the river with their own management, but necessarily how their obligation might mesh with the obligation of another Federal bureau and it is almost built into the system.

I think what needs to be done—and the testimony points this out—that there needs to be some kind of clearinghouse set up where various data can be exchanged and if I am correct, and if payment-in-kind program did execerbate the problem—not necessarily cause it—I think when a program like that is enacted by Congress, perhaps it ought to look at the possibility that it is going to, in fact, withdraw land from crop production which will require less irrigating, which will mean that the Colorado River will have that much more water in its system.

That, in conjunction with the heavy snows, wet spring, the reservoirs, is just another part of the mosaic that gets to the question of how did this problem occur.

Mr. McCandless. I am kind of led to believe that local government decides on any given evening depending on the power of persuasion what is or is not a flood plain. And as a result of that, we find or we might find ourselves with property owners who have purchased this property with the idea in mind that they can develop it, and that that development is approved by local government through the power of persuasion rather than the facts that should be before the governing body as to land use.

Is that a fair statement, or am I exaggerating the situation?

Mr. Charchalis. I think that is a fair statement.

Mr. McCandless. Are we saying that local government—and I comment that I am an advocate of local government—along the river of Arizona and Nevada is not capable of land use management?

Mr. Charchalis. I didn't say that. I think they are totally capable of land-use planning but I think it may have an obligation to protect the flood plain through land-use planning and very often doesn't understand the whole picture.

If the flooding didn't occur, we wouldn't be sitting here. But because of circumstances in legislature we are faced with a situation more or less trying to find out what occurred. Why did it occur? How we can better use management systems so it won't happen again?

Mr. McCandless. Let me use an example in your statement. You talk about the golf course—and in fact, it is partially flooded in the Needles area, and that was built in a flood plain. My understanding of the documents, certainly at the time that golf course was built, those who were responsible for making that decision realized that that land use of that flood plain lent itself to something like a golf course.

As an example, in my area we have a number of golf courses in channels purposely because the channel can be used for that, and if it does flood it is not too difficult to bring the channel back to its original state, replant the grass, and go back to playing golf.

Do I misunderstand this comment about the fact they felt that this was a safe area and for purposes of land use, that is, the golf course?

Mr. Charchalis. I think with respect to that particular illustration, a flood plain might be an acceptable flood plain. I am [inaudible] of what did occur in the flood plain. I think that is probably contrary to public interests.

You have a situation that occurs throughout the country. We have it in the Sierras with Lake Tahoe, trying to protect Lake Tahoe.

What do you do with people who have privately owned land in sensitive areas?

Mr. McCandless. Thank you.

Thank you, Mr. Chairman.

Mr. Reid. Mr. Charchalis, thank you so much for your testimony. I checked with Congressman Dymally and Durbin and there are no questions for you now.

I would also direct the court reporter to make the full testimony of Mr. Charchalis part of the record and also that of the other witnesses. Their complete witness statements will be made part of the record.

Mr. Reid. The next series of witnesses will be in a panel and we have some local witnesses who are now going to testify: Mr. Robert H. Clark, who is a regional manager of Playmate Resort Marinas; and Mr. Jack Datson, town board supervisor from Laughlin, Nev.; Mr. James A. Dunlap, regional manager for Forever Resorts, Echo Bay, Nev.; and Dr. Lee Cottrell, chief health officer for Imperial County, Calif.

Would you come forward, please, gentlemen.

STATEMENTS OF ROBERT H. CLARK, REGIONAL MANAGER, PLAYMATE RESORT MARINAS; JACK DATSON, TOWN BOARD SUPERVISOR, LAUGHLIN, NEV.; JAMES A. DUNLAP, REGIONAL MANAGER, FOREVER RESORTS, ECHO BAY, NEV.; AND DR. LEE COTTRELL, CHIEF HEALTH OFFICER, IMPERIAL COUNTY, CALIF.

Mr. Reid. Gentlemen, as we have told the other witnesses, we would ask you to identify yourself to the reporter. Also most of you have submitted written testimony, and this will be made part of the record for this committee that we will take to Washington.

We would ask—so that we can get into the meat of your testimony—that you summarize your statements so that we are able to ask questions and you can go in whatever order you would like.

Please make sure you identify yourselves. Grab the microphone and speak right into it.

Mr. Clark. My name is Robert Clark, regional manager for Playmate Resort Marinas. You have my written testimony. I will give you a brief summary of why we are here.

The object of our testimony is not to point a finger or blame any agency for what occurred in 1983, nor do we believe that precious time should be wasted in attempting to justify what happened in 1983.

Our objective, and what we hope will be the objective of everyone here, is to do everything within our power to prevent a reoccurrence of this year's disastrous flooding.

I am representing, in addition to Playmate Resort Marinas here today, Willow Beach, Las Vegas Boat Harbor, and Black Canyon, Inc.

Playmate Resort Marinas have four operations, so with those four—the three in addition to my resort—we had a total loss this year, because of the flooding in 1983, of $1,125,000. That is a staggering amount for the size of resorts and marinas on Lake Mead and Lake Mojave.

From June to September, our resorts reported 734 motel room cancellations in addition to 283 houseboat rental cancellations and those are staggering figures.

As you can see, the 1983 flooding in the Colorado River had a devastating effect on the recreational industry on Lake Mead and Lake Mojave.

If we and other concessionaires who operate on these lakes are to succeed, we must be assured we will not experience frequent reoccurrences of this year's flooding. It is impossible to attract visitation when our launch ramps are closed, our parking lots and utility systems under water, and the newspapers carrying front-page headlines that the Colorado River is on a rampage throughout the southwestern States.

Based on what happened in 1983 and the fact that all reservoirs are still to this date at or near capacity, we are reluctant to proceed with any meaningful planning for expansion of facilities. It is very difficult to look to the future when there is a strong possibility that frequent flooding will occur again during our bread and butter months of June, July, and August.

The flood of 1983 proved that the present flood management plan simply doesn't work. Literally, tens of millions of taxpayers' dollars are being spent to correct the problems and/or damage created by this year's flood. The various government agencies who developed and agreed to this plan in December 1982 must stop wasting time and admit to this fact.

Time is of the essence. If we are to prevent a reoccurrence of this year's flooding in 1984, and if we are to protect the environmental, recreational, and economic well-being of the Colorado River, we must act now.

On behalf of all the concessionaires on Lake Mead and Lake Mojave, and particularly our using public, I implore this committee to use its influence in bringing about expeditious action to correct a situation that can only go from bad to worse.

I would like to make one more statement, if I could, Mr. Chairman.

The concessionaires on Lake Mead and Lake Mojave got together and developed a petition that we began circulating among the public in local areas. We solicited signatures in support of the flood management plan.

If I may, can I read this petition?

Mr. **Reid**. Of course.

Mr. **Clark** [reading]:

> We, the undersigned, believe the flood control plan currently in use on Lake Mead and Lake Powell is insufficient to protect the environmental, recreational and economic well being of the entire lower Colorado River region. We demand a flood control plan be adopted that will allow full use of recreational facilities and beaches on all the lakes to insure the safety of those businesses and individuals that are located along the Colorado River.

What is most significant about this petition, Congressman, is the responses we have had. It has been on the street for only 12 days at our resorts at both sales and fish and tackle places in the local area. We have already received 1,500 signatures that support us in asking you to review the flood management plan. And I would like to present this petition now.

Mr. REID. I can see through these petitions, Mr. Clark, that there are numerous people in the States of Nevada and California.

Mr. CLARK. Yes, sir.

Mr. REID. We appreciate your testimony.

We have some questions for you. We are going to go through the whole panel and these petitions will become part of the record.

[See appendix A, p. 309.]

Mr. REID. Mr. Datson, you are next.

Mr. DATSON. My name is Jack Datson. I represent the town of Laughlin. I am vice chairman this year of the town board and seven casinos we have there.

I had been instructed on Tuesday of this week to come up here and tell you gentlemen that we respect what you have done and are doing. We had in our area 1 week's notice to prepare for the water rise. We did prepare for it and we had no damage as far as water was concerned, but we had lots of damage as far as news media was concerned.

And if there is any way to control that news media, we sure would love it.

Thank you.

Mr. REID. Mr. Dunlap.

Mr. DUNLAP. My name is James Dunlap. I am regional manager of Forever Resorts and my testimony would correlate to a great extent to what Mr. Clark has given.

As Mr. Clark, I was not informed about the summation. I am not really prepared to give you a summary, but we are a relatively small operation.

We have two resorts, one on Lake Mead, Collville Bay one on Cottonwood Cove, and we acquired those last year. During last year the business conditions, as everyone is familiar with, were not too good essentially because of economic conditions. But we started off the year believing that 1983 was going to be pretty swell.

The first 5 months of the year we kept receiving projections on the levels of the lake which, of course, is of great concern to us, and there were only minor variations and we had no real reason to suspect that the agencies that were responsible for the management of the reservoirs had apparently not taken into consideration massive snowfall and the spring runoff implications.

On June 2, I received a letter from Mr. Jerry Wagers, superintendent of the National Recreation Area, and in that letter he advised us that we have just been advised by the Bureau of Reclamation that extremely high levels of water will be coming into the Lake Mead area. This has been caused by above normal snowpack and unreasonably warm weather resulting in rapid snowmelt.

This resulted in approximately a 6-foot increase in the elevation of Lake Mead by the end of June which will put Lake Mead in the 12- to 18-foot range.

Well, up to that point, the projections have been consistent with what the lake level had been, so we had no choice but to immediately take all the defensive measures that we could take to protect our assets, to protect our marina.

As a result of those measures—and I have listed them, I won't go into them—but from those measures and the measures that the National Park Service took, we had to divert labor from the normal marina operations to the high water projects. We had to employ additional labor and at Collville Bay we had high-water material costs of $84,000, a labor cost of $88,000, and an estimated loss of business of $123,000 for a total of $296,00 for this period.

This, as Mr. Clark has said, for us as a small operator is a staggering loss.

The other problem that we had, as Mr. Clark has stated, was the press that was received as a result of this happening. It was particularly damaging—there were precious few incidents in which the news media made any attempt to emphasize anything positive by telling the public that the marinas were still open for business in spite of the increased water levels.

As a result of that adverse publicity in California, our Cottonwood Cove business just dropped dramatically, and loss of business there is estimated somewhere between a quarter of $1 million.

Cottonwood Cove was never affected by high water, but at a recent Los Angeles County Fair, we had people actually come up to our booth and say, "Is Cottonwood Cove still under water?" That was what the adverse publicity did to us.

The repeat of flooding conditions we all experienced this year is horrifying to us, and it is our fervent hope that flood control plan will be modified and implemented in time to prevent a repeat of this year's disaster.

Thank you for permitting me the time to express our views, Mr. Chairman.

Mr. **Reid**. Thank you, Mr. Dunlap.

Mr. **Reid**. Dr. Cottrell.

Mr. **Cottrell**. Thank you, Mr. Chairman.

[Inaudible.]

Mr. **Reid**. We are not hearing you.

Mr. **Cottrell**. What is that?

Mr. **Reid**. We are not hearing you. Only way to do it is to talk into the microphone.

Dr. **Cottrell**. I want to express my gratitude for the privilege of being here and talking to you. I feel a little uncomfortable sitting next to these men because some of the publicity may be laid at my feet. But we should be reminded that where you stand is not always determined by where you sit, and my responsibility is to the health and safety of not only my constituencies in my small county, but the health and safety of all people who would come in contact with the potential health hazards.

And in contemplating talking to you today, my first statement was that on or about June 16 there was an untimely release of water flooding the Colorado River. My first debate with myself occurs over the word "untimely" because my choices were "irresponsible," "stupid," and I end up with "untimely" because I do not have a problem with the fact that there is an excess of water.

But I do have a problem with the planning that went into the timing of the release.

I do not believe that they had public health input into that information because we could not predict what would happen had flooding hit our portion of the State with the untimely temperatures and our known history of harboring mosquitoes which can convey the disease of encephalitis.

To make the total problem now reduced to what we should have done and what we could have done to respond to the emergency as it addressed public health, I have to go into a calendar-type scenario. But on June 20, this was only a few days after the release of water, the chairman of our board of supervisors reviewed the damage that had actually occurred through seepage of water, and this was prior to the assault of the actual flood. And on the basis of our input to him, which was based on our observation of how the larva of the mosquito was growing, he declared a local emergency situation. And at that time we notified the doctors that were practicing in the area, we notified the State Department of Health in California, and we notified Yuma County Health Department of the potential assault on the health of our citizens that was building up.

Mr. **Reid**. Doctor, tell us why you were concerned about encephalitis, tell us what encephalitis is.

Dr. **Cottrell**. Encephalitis is a disease which attacks the nervous system, primarily in the brain, usually affecting senior citizens and is conveyed by a mosquito vector and is produced by a virus.

Mr. **Reid**. What is the—what happens when someone gets it?

Dr. **Cottrell**. You can run a gamut of symptoms. It can be from a mild case of flu to a state of vegetation, or death.

At this time, around June 28, we then asked the State of California for assistance to confirm our impressions of the situation that was rapidly developing. The State of California was very reluctant to join with us and they coined a phrase which we were to hear constantly for the next 3 months, and that was, "We have no bodies."

Regardless of how we talked, as you come closer to the level of people, you become more concerned with prevention of crime and apparently—and this has been supported by our dealings with the State Department of Health and then FEMA—the further you get away the more they are obsessed with the investigation of cases rather than the prevention.

On July 1 we had exhausted our entire budget and I went to Sacramento to appear to the Legislature of the State of California [inaudible].

Mr. **Reid**. Please go ahead, Doctor.

Dr. **Cottrell**. On July 1, approximately 15 days after the release of water, I went to the State Department in Sacramento and asked for financial assistance to fight the mosquitoes. By now we had observed the growth, both our traps, both the encephalitis surveillance traps and the New Jersey live traps, the counts were observed but had not been documented.

And at that time we were able to convince the State Department of Health Service that we did in fact have a problem and that they were willing to help us in any way they could.

The State of California was going through a very severe budget debate and pitting the legislature with the Governor's office, and we had not—we did not have access to special legislation for funds. However, they did find $23,000 left over from the 1982–83 year in a fund known as SNAP, which is special needs assessment planning, and we were given that amount of money.

By this time our counts of mosquitoes were grossly made and determined that they were in the area of 20,000 per trap. And in our 10 years of surveillance we have never encountered more than 200. So we were dealing with a 10,000 increase in numbers.

At the July 1 meeting we convinced Mr. Rank, who was director of the department of health services, that we needed his assistance to shake the—rattle the cage of FEMA. We were told by a FEMA representative that we have to go through our own State office of emergency services and that we would have a deadline of 5 o'clock that night to prepare a letter to them seeking this request.

This letter was rapidly put together, approved by the Governor's staff, approved by the department and was delivered. At no time were we given any other information except that we had to have that letter.

On July 5, 5 days after we delivered that letter, we were told by the State department of emergency services that FEMA could not respond to our needs until CDC had assessed the situation and had made a concurrence with our impressions.

On July 11, which is 5 days after that notification—I have subsequently been told that that was the most rapidly that any jurisdiction got a response from CDC to a FEMA request—a man from Fort Collins, Colo., came and he agreed in total without any exceptions. He agreed with our assessment that had been made approximately 14 days earlier.

Unbeknownst to me, at the time of this assessment our first case of encephalitis was incubated. By this time, by the time the CDC was agreeing with us, we had our chicken flock, which is a central flock that we deploy along strategic situations of the river, had converted to positive reflecting an infection of the disease.

Our usual conversion takes place a little bit later, it does get higher. But at this time we were 50-percent converted and at this time we had in fact identified the first mosquito carrying virus in one of our encephalitis traps.

On July 19, 1 month after we released the water, FEMA called a meeting in Yuma, Ariz. At that time there was nothing constructive said in regards to assisting the people along the Colorado River who were going to have health problems.

On or about the 13th of July, a state of emergency was declared and to show you how naive we were, we were not aware of the original statement coming out of Sacramento and Washington that it addressed only the private sector and that the public sector was left sequestered from any assistance that could be coming down from Washington.

We had at this point exhausted the moneys that we had gotten from the State, and at this point I want to interject that 2 weeks prior to July 13, we had alerted Alameda Naval Air Station, naval training section for vector control, who has the ultimate state-of-the-art equipment, to fight and suppress the mosquito vector to stand by——

Mr. REID. Which means mosquito bite? Vector is a bite?

Dr. COTTRELL. Means a carrier, yes. Sorry.

But because we could not come up with the 25-percent cost—and I do not even know where this came from, but we were told it would probably exhaust the county budget, we had to let that equipment sit on the ground in Alameda while our case of encephalitis was now incubating.

On September 6 we were notified by a letter from FEMA that was dated—and I am not picking now, but it seems like they delight in putting the screws to us—a letter dated August 14, I mean the 24th, excuse me, that would make it approximately 2 weeks—that they had denied us assistance and had declared an emergency, a situation that was within the capabilities of the local and State agencies.

On or about September 24, we finally got a declaration that included the public sector and specifically addressed the public health issue. On September 30 a meeting was held in Palm Springs to tell us how to fill out the forms, and on October 5, which is approximately 75 days after the release of the water, they made an onsite inspection and assessment of the damage.

The thrust of this is that there apparently is no national policy for health and safety which would transcend other types of damages caused by disaster, be it manmade or natural, and we would certainly recommend that some efforts be made to employ a national policy which would say, in essence, that any threat to the public health and safety must be responded to in financial helps and then we will recoup and decide whose responsibility at a later date.

Because as of now, when I called my office this morning, we have had 10 cases of encephalitis. One death occurred and this unfortunately has the least amount of information about it because it occurred in Mexico across the border from us.

We also want to point out that in our original assessment plan made on or about July 1, we anticipated some instruction from people who would not believe in, quote, "The people wanted the body," unquote, and we put in our report three historical events: one occurring in the Ohio Valley, one occurring in the eastern Texas area, and another occurring in Canada.

We thought that we could give people a scenario of response now and your costs are going to be approximately 10 percent of what they will be if you wait and delay and delay.

Thank you very much, Mr. Chairman.

Mr. REID. Thank you very much for that testimony.

I have a couple of questions of the panel.

Mr. Clark, tell me how—well, you do not need to tell me how, but it appears from the testimony that you gave, that clearly this flooding has a tremendous impact on tourism; is that a true statement?

Dr. COTTRELL. Yes.

Mr. REID. What is the estimate? I know that Mr. Dunlap gave the percentage saying 85 percent of the people that come to Cottonwood Cove are from California.

Do you have an idea as to how many—what percentage of people that come to your facilities are tourists, so to speak, compared to people that are from here in Clark County?

Mr. CLARK. Well, it all depends on the resort, Mr. Chairman, obviously. Echo Bay, for example is a houseboat rental operation. So we will probably say 75 to 85 percent of Echo Bay business would, in fact, be out of State.

Southern California I would say is primarily our market.

Lake Mead, it would be more of the Las Vegas Valley.

Mr. REID. But it is unquestionable that this problem has prevented a lot of people from coming to your resorts?

Mr. CLARK. Absolutely. We estimated approximately 20 percent down in actual use visitation. I know the Vegas, Las Vegas area latest statistics is 13.5 percent up in their tourism. But if you look at that across the State, the line of traffic is up 1.5 percent. We feel that with the economic turnabout in 1983 it probably should have been more like 4 or 5 percent, and that is probably where we got hurt on our 20 percent down.

Mr. REID. And the fact that the tourists that did not come and did not spend money, this is how you allocated your lost revenues?

Mr. CLARK. Absolutely.

Mr. REID. Now, each of you or each of the three of you talked about how the press, in effect, damaged your reputation and that people would not come because the flooding was bad.

Now further down the river the flooding was really bad and did hurt recreation; is that not true?

Mr. CLARK. Yes, sir.

Mr. REID. Do you feel that perhaps it was harder for the people to differentiate between the two areas and that is what caused the problem?

Mr. CLARK. Yes, obviously what happens in a case like that, Mr. Chairman, is there is flooding on the Colorado River. The headlines in southern California say it is flooding on the Colorado River. Then there is a small little article that says, as the flood waters rise it is chasing the rattlesnakes out of their holes. So now I have got a customer who is going to come out to Lake Mojave houseboating and next thing I know he is canceling his houseboat vacation because the packs of rattlesnakes will get him when he gets off the boat.

We had cancellations of people who said that the septic tanks of the people who lived next to the Colorado River had been flooded so sewage now is contaminating the river. We got that.

We got cancellations from people who said that their local Triple-A office in southern California or in Phoenix said that the roads are flooded out, you cannot make it there.

This gentleman is from Laughlin and I have talked to Laughlin people. They spent in Laughlin, and I am told, approximately $150,000 in advertising costs just to counteract that publicity in southern California. We here on Lake Mead and Lake Mojave did the same thing with press releases and advertising.

We pumped out a press release almost every fifth or sixth day trying to point out the positive effects of a flood, if you will. There is more water to see, that kind of thing.

So no matter what happens on the Colorado, when it floods, we are all going to be affected.

Mr. Reid. Dr. Cottrell, when we were down in Yuma I believe it was, at that time I think you had just found that day your second case of encephalitis; is that right?

Dr. Cottrell. That day I saw you in the hall, Congressman, I reported to you that we had our first case.

Mr. Reid. So there has been nine since then?

Dr. Cottrell. Yes.

Mr. Reid. Congressman McCandless, will you proceed, please?

Mr. McCandless. Thank you, Mr. Chairman.

I am trying to digest something—and I apologize for not having been in the Bullhead City area—my son has probably more than made up for that over the years. He is an avid water skier so hopefully we have contributed to the economy of the area. But I am a little confused in that previous testimony talked about the fact that Laughlin and Bullhead City—that the 40,000 consecutive feet flow is now acceptable and does not seem to bother anyone. Nevada Club is the only one with properties below that level and they are protected by a wall. There is some inconvenience about the ramps, various docks, and it is not a hindrance nor does not seem to present too much of a problem between Bullhead City and Laughlin.

I am paraphrasing it rather than to read directly.

Then, that in Yuma and in Needles we were told the flooding which had inundated some of the recreation facilities could have been prevented if the advice given to the land use planners by the Corps of Engineers and other people responsible for management of the river had been adhered to by the local decisionmaking body.

Is there some correlation there? Have you had the problem that they have talked about in Yuma? Or is your problem one of loss of tourism or a combination?

Mr. Clark. Well, speaking for Playmate Resorts because this gentleman is from Laughlin, we have Lake Mojave Resort and Kathryn's Landing which is right there at Davis Dam. The Lake Mojave elevation is 647.

The facility there at Kathryn's is programed above 647, so Kathryn's Landing on Mojave did not have a problem with high flood waters, but we did have problems because of a reduction of tourism and cancellation of people not wanting to come to the area because of the flooding condition.

Mr. McCandless. Your facilities were not damaged by the increased flow? It was a question of the adverse publicity?

Mr. Clark. That is right.

Mr. McCandless. Thank you.

Mr. Datson. Now in the Laughlin area it is true that there were some three-quarters of a million dollars spent in rectifying walls and that sort of thing on the seven casinos, but that was absorbed by the casinos. We are not saying anything about that.

We are saying that business as of the 15th of June was up 32 percent over the year previous and it dropped. We are just now starting to pick that increase up. It killed us.

Mr. McCandless. Primarily a loss of business rather than property damage?

Mr. DATSON. If the media had said that Laughlin was safe, we would have had no problems, but they said that Laughlin was buried, the casinos were washed out, which is not true. We are very much in business and, as of the day before yesterday, I received a call from San Diego asking me if they had repaired the damage in Laughlin.

Mr. DYMALLY. Gentlemen, how are you going to begin to repair that misinformation that went out?

Mr. DATSON. By word of mouth and by the advertising that has been spent in trying to rectify in different magazines, different papers over the year, and television. We are bringing that business back.

Mr. DYMALLY. Thank you.

Mr. REID. Congressman McCandless.

Mr. MCCANDLESS. With respect to the encephalitis, Doctor, this is a severe problem along the Colorado River and Riverside County also?

Dr. COTTRELL. That is true.

Mr. MCCANDLESS. It is my understanding that shortly after our hearings on September 7 and 8, within a few days after that, that the necessary aid was forthcoming from Federal agencies, being FEMA or otherwise, to assist the county government who has the basic health responsibility to mitigate the problem.

Is my assessment of this correct?

Dr. COTTRELL. No.

Mr. MCCANDLESS. You are still having the problem?

Dr. COTTRELL. We are now, as of September 25, clearing it up.

Mr. MCCANDLESS. You currently have the resources to mitigate the problem?

Dr. COTTRELL. Correct.

Mr. MCCANDLESS. Although it was long in forthcoming, it is now here?

Dr. COTTRELL. Yes.

I might add in some of those cases of encephalitis that I related, some are from your area.

Mr. MCCANDLESS. I am very familiar with the problem having spent 12 years in county government.

Thank you, Mr. Chairman.

Mr. REID. Thank you, Congressman McCandless.

Congressman Dymally, do you have anything further?

Mr. DYMALLY. Thank you, Mr. Chairman.

Mr. REID. Gentlemen, we really appreciate your testimony and the full statements will be made a part of the record.

Thank you very much for your time and effort in working with us. Dr. Cottrell, thank you.

Mr. REID. Next witnesses are disaster victims and people from Coalinga, Calif. The mayor of Coalinga, Mr. Donald Dapelo, and former small business owner from Coalinga, Mr. Jack Kemper.

Would you please come forward? Please state your name for the record, and we have received the text of your testimony and would appreciate it if you would summarize this testimony. These two statements will be made part of the record.

Please proceed.

STATEMENTS OF HON. DONALD DAPELO, MAYOR, COALINGA, CALIF.; AND JACK KEMPER, FORMER SMALL BUSINESS OWNER, COALINGA, CALIF.

Mr. DAPELO. My name is Donald E. Dapelo, mayor of the city of Coalinga, Calif., and as stated in the documents we have already submitted, our population is about 7,200 people.

Mr. REID. We have known for a number of years of Coalinga Junior College; is that still there?

Mr. DAPELO. Yes; it is. Changed the name.

Mr. REID. Pretty good ball team.

Mr. DAPELO. As most of you people know, on May 2, 1983, two faults on either side of the city slipped and caused an earthquake. The magnitude of the resultant earthquake was 6.7 on the Richter scale.

In a few moments our entire downtown community was destroyed, most of the buildings were of 60 years of age and up, masonry, brick, and so forth, and all of these buildings were unable to withstand an earthquake of that magnitude; 90 percent of the area was destroyed. Approximately 563 homes were totally demolished and 637 others had considerable damage.

Very quickly after the earthquake occurred the Red Cross and Salvation Army were there. So was FEMA and Office of Emergency Services from the State of California. The Office of Emergency Services estimated the damages to be $31 million, which had occurred in a community where the set evaluation was probably in excess of $60 million, so we had 50 percent of our community all or totally destroyed by the earthquake.

A one-stop disaster assistance center was set up with many Federal, State, and county offices represented there. FEMA assisted in getting the agencies together but they could not make a silk purse out of a sow's ear. The promises fizzled. Hopes were extinguished.

FEMA assistance has never been clear, but we feel that it is as follows: To provide mobile homes but not the sites for them; to provide funds to render the devastated area safe, but not to put it back together; to provide assistance in bringing in other Federal agencies to assist.

We do not believe this is enough. Government must be willing and able to take care of disasters. Is the sole purpose of Government to regulate our lives and take our taxes? Of course not. It is a basic responsibility of Government to assist its citizens in time of need.

We believe the words, "don't spend," have filtered down to the staff people who have come to help. We believe that they have gone beyond what the Congress or the administration wants. They come to help, if they do not have to spend. This has had a chilling, psychological effect on our citizens.

It is my hope that this subcommittee can help rectify the situation, and there are many ways in which it can be done. In the report I have submitted to you—I have come with additional notes that are not in the document we have submitted, and I would like to touch on that now.

As I understand it, the title of this subcommittee is investigations and oversight. Gentlemen, someone in Government and in disaster-relief programs must recognize that seismology, the study of earthquakes, is still a relatively new and inexact science.

For example, even though Coalinga is situated in a fault-producing area and within 20 miles of the well-studied San Andreas Fault, and many, many psychological surveys have been conducted in the area, no one knew anything of the fault which on May 2 caused the devastation in our city, the magnitude of which on the Richter scale was originally set at 6.1, finally established at 6.7.

The magnitude of a flood or tornado is easily observed by the uninitiated eye, and if another flood occurs soon after, anyone can tell if the water has moved higher or damage is more intense.

This is not the case with an earthquake and it is this oversight I would like to bring to your attention.

No one in FEMA seems to realize or wants to admit that on July 25, 1983, 84 days after May 2, Coalinga had another earthquake, not an aftershock. The destruction force of that earthquake cannot always be measured accurately by the Richter scale.

The direction, whether vertical or horizontal, can in any direction have a tremendous bearing. Yet these aspects cannot be measured by the Richter scale.

On July 25 an earthquake was recorded of the magnitude of 5.1, yet home foundations damaged on May 2, but determined to be repairable, were back in by that earthquake and I have a graph supplied by Mr. Jeff Cope, who is the head of the State of California Department of Architecture which indicates that the ground movement of the earthquake on July 25 was 13-percent greater than that on May 2.

Since FEMA had a time limit of 120 days in which victims of disaster must act in order to receive assistance, our community had only 15 days to [inaudible] designated buildings which were previously repaired which would then have to be demolished.

Obviously, that deserves as much time as possible and as a result, many private citizens could not qualify for 75 percent of assistance in removing their ruined homes.

Also, thus far, FEMA has refused to reevaluate or reexamine our fire loss which was severely damaged on May 2 and again on July 25.

It is my opinion that this is the sort of situation that this subcommittee was designed to correct and for this reason, I am bringing it to your attention.

Mr. Chairman, I thank you for the opportunity to speak before this distinguished panel and if there are any questions I will, of course, answer them now.

Mr. Reid. We do have some questions, but we will wait until we hear from Mr. Kemper and ask questions at the same time.

Mr. Kemper. Thank you.

[Inaudible.]

Mr. Reid. Mr. Kemper, we can't hear you. Pull it a little closer.

Mr. Kemper. I have been asked to tell the committee how I was affected by a disaster, and my feelings regarding the Federal programs assigned to help individuals in a community.

It has been 5 months since the devastating earthquake of May 2 which involved a major portion of the downtown businesses and homes in Coalinga. I feel it is time for me to let you know how this catastrophe has and is affecting me, a 56-year-old former businessman, taxpayer, veteran of two wars, father of five with the three youngest enrolled in colleges this year and presently unemployed.

Our family owned a very successful restaurant and catering business in Coalinga. We employed 20 people. Our 6,500-square-foot facilities had a seating capacity of 200 persons. The business had been established since 1948 and we owned it since 1977.

We were planning to use the income from the sale of the business in future years for our retirement. Our modest savings are rapidly being depleted. We have lost the wherewithal to make a living and contribute to society other than in a personal way.

We still have a mortgage of $158,000 with an interest rate of 8 percent that would have been paid off within 10 years. Until this debt is satisfied, I cannot foresee any possibility for getting back into business in our own facility.

Even if we did not have this obligation, increased cost of new construction will require a loan of approximately $390,000 to rebuild only 4,500 square feet at an SBA interest rate of 8 percent.

To be able to use the SBA loan approved, we would have to provide almost $60,000 cash on our own. Monthly payments would increase from $1,777—10 years remaining—to $2,571—for a period of 25 years.

There is considerable doubt we could afford to pay the increased amount every month, from revenues generated from a much smaller facility. And, if we can't get out from under our present obligation, our monthly payments would be $4,248, an amount impossible to repay.

So much for my personal problems. I can't understand why governmental agencies must use the same criteria for a Federal disaster rebuilding program that they use for regular situations.

I understand that CBDG grants are made available to people who have desperate housing need at even no interest. Liens are placed on the property for the amount of the loan.

Why doesn't or couldn't a similar program be made available for small businessmen? Developers for Farmers Home are given grants or 1-percent loans so that providing housing becomes feasible.

Desperate needs for grants or 1-percent interest loans will exist after future major disasters, why not now?

If there were possible, many small businesses could get back into business. They would hire and pay employees, thus reducing unemployment. Income taxes—State and Federal—and spendable income would result.

We could generate profit dollars upon which taxes are paid and, hopefully, stimulate community growth with a resultant improvement in the economy of our community, county, State, and Nation.

Immediately after the May 2 earthquake, we were deluged with representatives from innumerable governmental agencies, all of them telling us what good things they were going to do to get us going again.

A great many of them were never heard from again. Of those that did reappear many have offered nothing more than lipservice.

I have already mentioned SBA's lack of a disaster program.

UDAD talks a lot, but doesn't seem to have much to offer. They sent two people to Coalinga and spent several hours gathering information from a large group of property owners and businessmen.

After the meeting, I was asked to spend another hour with them in a private conference to discuss in detail my own situation and needs. Neither of them have been heard from since.

A representative from Farmers Home arrived 2 days after the quake. He told of funds that were available at 1 percent interest. He knew of other agencies in addition that had money for this type of thing. As far as I know, we have never heard from or seen him since.

Funds were requested from EDA for construction of buildings downtown for use by businesses to get going again. It literally took months for EDA to approve this request which came through a day or so before the end of the Federal fiscal year.

Since it was announced that I would be appearing before this committee, several of our community leaders have asked me to mention some of their concerns or gripes.

Jim Lam, city councilman and mayor pro tem, is upset that the Federal people took all motel rooms within 50 miles. They all wanted single rooms and were each on $90 per diem. No rooms remained available for those that lost their houses or people who came to be with them and assist them.

Bob Cassio, president of Allen Ranches and city councilman, has several concerns: There is a 100-day period to file certain claims after being declared a disaster. Floods may take 3 to 6 months to clean up, reconstruct and engineer.

Earthquakes are followed by aftershocks and afterquakes, some of which, as the July 21 earthquake, do as much or more damage than do the original.

No extension of the original 100-day period is provided for. Rules must be flexible enough to provide needed assistance.

When you talk to Federal agencies regarding loans or grants, they talk like they are trying to keep crooks from ripping off the system rather than helping those in need.

Federal disasters mean nothing as far as help for the individual. Even now, I am certain that people who have not experienced a disaster think Government is going to help, think there is a low interest financing that is available, and are lulled into a false sense of hope.

Then FEMA arrives and they learn that FEMA can't loan or provide funds and other agencies don't have the ability to help. The bubble bursts and anxiety, frustration and even apathy set in.

I realize that statistics are the spinal cord of many governmental agencies and are used to point out the volume of their work and what good things they do, as well as assist in justifying their agency's continued existence.

Many of these statistics are honest fabrications.

Mr. Cassio investigated cases of 12 people in Coalinga who had been verified for an SBA loan. None of the 12 had taken out the SBA on their offer of a loan. Why?

Is it because they didn't know that loan terms could be changed? Is it because they didn't know the procedures to request additional funds? Is it because they didn't know they could "roll over" an existing loan into a new SBA loan?

Is it because some loans carry such a short repayment term such as 3 years?

A much higher percentage of people would take advantage of loans offered if they really had the programs explained so that they could understand their options.

If I were head of SBA and statistics were presented constantly that showed an extremely high percent of nonacceptances, I would certainly become concerned and do some investigation of the circumstances and reasons why.

I can recall several weeks after the earthquake the cries of SBA that they had given out over 300 packets of information and had only received a handful of applications. Doesn't that tell you something? It tells me something. It tells me that people did not understand. It tells me that people were overwhelmed with the paperwork and research details required.

It tells me that when handed a pile of papers with the top one—factsheet, disaster loans—showing the lowest possible business loan at 8 percent, you just plain get turned off. This you don't need in a time of crisis.

Having observed a major disaster I have a suggestion that can benefit others in the future. A truly professional disaster team or teams made up of knowledgeable representatives from other agencies should be developed, all of whom are trained, intelligent individuals who understand and have knowledge of all agencies' abilities to assist.

This disaster team must be ready to go where needed and be accompanied by trained specialists in all areas.

The disaster teams and their managing agency must be allowed some flexibilities to permit the providing of services, loans, grants, et cetera, in verifying circumstances which are present after different types of disasters.

For the record, I would like to thank several organizations who assisted beyond expectations and who are all forever in the hearts of the citizens of Coalinga. These organizations performed without pay, without paperwork, without questions and without making you feel that they were doing you a favor to be of service.

They include: Salvation Army, Mennonite Disaster Services, Coalinga Disaster Christian Response, American Red Cross, California Conservation Corps. Those are the people who know how to help after a disaster occurs.

Gentlemen, I realize this is probably not the proper forum, but how can we continue to justify sending billions of dollars to foreign nations, many of whom are not even friendly to the United States, and continue to ignore the desperate needs of our own citizens who have worked and paid their taxes for many years?

Thank you for this opportunity to address the subcommittee.

[The prepared statements of Mr. Dapelo and Mr. Kemper follow:]

Statement Before

SUBCOMMITTEE ON INVESTIGATION AND OVERSIGHT

HOUSE COMMITTEE ON SCIENCE AND TECHNOLOGY

By

Donald D. Dapelo, Mayor
City of Coalinga, California

Honorable Albert Gore, Chairman, and Mr. Harry Reid, M.C.

I am Donald D. Dapelo, Mayor of the City of Coalinga, California. Our community is a small rural community (7,250 population) located in southwestern Fresno County in California's Central Valley. Fresno is the County seat and is 65 miles away. The major source of employment is in the oilfields which surround the Pleasant Valley (45,000 acres) in which Coalinga lies.

On May 2nd, 1983, two faults on either side of the City slipped. The magnitude of the resultant earthquake was 6.7 on the Richter Scale. In an instant the downtown was destroyed, 563 homes were demolished, and 637 had major damage. There was not a single building that did not suffer some damage. Our downtown streets were impassable, water mains and services were broken everywhere, telephone service was disrupted, communication towers collapsed, emergency generators were separated from their fuel tanks, the City's gas distribution system was turned off, electricity was off, gasoline and diesel pumps did not work, and sewer lines had collapsed.

The American Red Cross and the Salvation Army arrived the day after the earthquake, and FEMA and OES arrived soon after that to assess the damages for the purpose of having the President and the Governor declare a disaster. FEMA and OES estimated the damages to be $31,000,000, and both the President and the Governor immediately declared the area a disaster. This meant that the vast resources of the Federal and State Governments, as well as the Red Cross and the Salvation Army, could be brought to the aid of our community which looked like a war zone.

What a relief to know that the Government that has won wars, bailed out foreign governments and put man on the moon was going to save Coalinga. Soon we had the leaders of Federal and State agencies in town. A meeting was held in the Elks Lodge building; both State and Federal Legislators were there, with the cadre of agencies. Promises ran high, millions from everywhere were offered to assist in rebuilding.

A one-stop Disaster Assistance Center was set up, with many Federal, State and County offices represented. Elation was high - then the let-down. Each agency now points out, one after another, that it has no emergency programs. No multifamily housing has been started, no commercial buildings have been rebuilt. In the downtown area, after the buildings had been demolished and removed there would have been gaping holes in the ground had not the City itself paid for the removal of foundations and filling and compacting the basements to ground level.

FEMA assisted in getting the agencies together, but they could not "make a silk purse out of a sow's ear". The promises fizzled, a few sputtered but they still went out. Hopes were extinguished. FEMA assistance has never been clear. We believe that it is as follows:

> To provide mobile homes , but not the sites for them.
>
> To provide funds to render the devastated area safe, but not to put it back together.
>
> To provide assistance in bringing in other Federal agencies to assist.

We do not believe this is enough, and we would doubt that any Legislator or private citizen would believe that this is what is meant by a Presidential Declaration of a Disaster.

Government must be able and willing to take care of disasters. Is the sole purpose of government to regulate our lives and take our taxes? Of course not; it is a basic responsibility of government to assist its citizens in time of need. The Eisenhower, Kennedy, Johnson and Nixon Administrations seem to have provided better and quicker assistance to communities struck by disasters than is now being provided.

We believe that the words, "Don't Spend" have filtered down to the staff people who have come "to help". We believe they have gone beyond what the Congress or the Administration wants. They come to help, if they do not have to spend. This has had a chilling effect and has perverted Congressional intent. It has become apparent to me that, although various agencies have so-called "Disaster Relief Programs", they are either unfunded or are structured to apply to a very narrow section of the populace.

It is my hope that this Subcommittee can help rectify the situation, and there are many ways in which this can be done. Let me name a few.

1. Low, or no interest loans be made available for rebuilding. This is one of the quickest ways to encourage rebuilding and help the economically injured.

2. Provide a National Earthquake Insurance Program. The insurance companies are going to great lengths to rewrite policies so they will never again pay on earthquake damage. Earthquake insurance is unavailable in Coalinga, and yet we are told by some agencies that we must have earthquake insurance.

3. Allow FEMA to tap other agencies' funds that have been approved but have no chance of being spent by those agencies.

4. Have each agency include a 10% Emergency Fund in each program that deals with communities, and a disaster plan that will allow rapid reaction to bring relief to the victims, with an easing of some of the unnecessarily repetitious filing of forms and applications which have overwhelmed us since May 2nd.

5. Make equipment and personnel from the Armed Services available to help repair and rebuild public facilities.

It is my hope that no large community or area will ever have an earthquake, but I now know this is wishful thinking. I have been told that of the 10 largest earthquakes in this country since the 1800's only one was in California. When earthquakes of the magnitude of the Charleston, South Carolina, or the New Madrid, Missouri earthquakes occur again the damages and injuries will be statewide instead of only a small locality. It is our hope that FEMA will be ready.

Mr. Chairman, I thank you for the opportunity to speak before this distinguished panel, and if there are no questions I would like to now introduce Mr. John Kemper, one of our Coalinga businessmen, who can give you some information concerning the effect of this disaster on private citizens.

Mr. John G. Kemper
106 S. Joaquin
Coalinga, CA 93210

August 18, 1983

The Honorable Alan Cranston
United States Senate
Senate Office Building
Washington, D. C. 20510

Dear Senator Cranston:

It has been 3½ months since the devastating earthquake of May 2nd demolished a major portion of the downtown business district and hundreds of homes in Coalinga. I feel it is time for me to let you know how this catastrophe has and is affecting a 56 year old former businessman; taxpayer; Veteran of two wars with over 30 years in the Naval Reserve; father of five with the three youngest enrolled in colleges this year; and presently unemployed.

Our family owned and operated a successful restaurant and catering business in Coalinga. We employed 20 people. Our 6,500 square foot facilities had a seating capacity of 200 persons. Lacey's Cafe has been in business since 1948. We have owned it since 1977. Our restaurant was well known by travellers throughout the San Joaquin Valley and was a meeting place for the community and surrounding area. We were planning to use the income from sale of the business in future years for our retirement. Our equity and retirement are gone as are the buildings and business. Our modest savings are rapidly being depleted. We have lost the wherewithal to make a living and contribute to society other than in a personal way.

We still have a mortgage of $158,000.00 with an interest rate of 8% that would have been paid off in 10 years. Until this debt is satisfied, I cannot forsee any possibility for getting back in business. Even if we did not have this obligation, increased costs of new construction will require a loan of approxiamtely $390,000.00 (to only rebuild 4,500 square feet) at an SBA interest rate of 8%. To be able to use the SBA loan approved, we would have to provide $60,000.00 cash on our own. Monthly payments would increase from $1,777 (10 years remaining) to $2,571 (25 years). These is considerable doubt that we could afford to pay the increased amount from revenues generated from a facility 2,000 square feet smaller. In addition, at my age it is hard to imagine a 25 year indebtedness.

YES, we though we were fully covered by our insurance but learned that earthquakes were not included!

So much for my personal problems. I cannot understand why governmental agencies (SBA, for expample) must use the same criteria for a Federal Disaster rebuilding program that they use for regular situations. I understand CBDG grants are made available to people who have desperate housing needs at even no interest. Liens are placed on the property for the amount of the loan. Why doesn't or couldn't a similar program be made available for small businessmen? Developers for Farmers Home are given 1% interst so that providing housing becomes feasible. Desperate need for grants or 1% loans will exist after future major earthquakes - why not now! If this were possible, many small businesses could get back into business. They would hire and pay employees thus reducing unemployment. Income taxes (State and Federal) and spendable income would result. We would generate profit dollars upon which taxes are paid and, hopefully, stimulate community growth with a resultant improvement in the economy of our community, county, State and nation.

Immediately after the May 2nd earthquake, we were deluged with representatives from innumerable governmental agencies - all of them telling us what good things they were going to do to get us going again. A great many of them were never heard from again. Of those that did re-appear, many have offered nothing more than lip service.

I have taken the liberty of attaching a copy of a "Letter to the Editor" in the Fresno Bee, May 20, 1983 edition. I don't know the lady who wrote the article (please note that she is not even from Coalinga) but certainly agree with her comments. How, sir, can we continue to justify sending hundreds of millions of dollars to foreign nations, many of whom are not even friendly to the United States, and continue to ignore the desperate needs of our own citizens who have worked and paid their taxes for many years?

Should you feel, after reading this letter, that a personal conversation would be of value, I would appreciate the opportunity to meet with you or your representatives. Thank you for understanding and for any help you can give us and others here in this situation.

Respectfully,

John G. Kemper

(209) 935-3445

Letters to the Editor

Editor of The Bee
1626 E. Street
Fresno, CA 93786

• THE FRESNO BEE Friday, May 20, 1983 B7

Aid to Coalinga

Isn't it ironic that whenever there is a disaster anywhere in the world, our government in Washington, D.C., is the first to send millions of dollars in aid, not to be repaid. Our tax dollars, including Coalinga's tax dollars, are used for this.

So if the Coalinga residents could have signed a foreign address when they applied for help after the quake there would be no problem. As it is they had to fill out loan papers, promising to repay the government with interest. Many of their places of employment were destroyed.

Washington should cut through red tape. These people need help so they can help themselves. They are honest and hard-working, but destitute now. I don't call this charity. If it is, charity begins at home anyway.

Reagan has stated everyone should help his neighbor, but I guess that doesn't include him, as he was at his ranch, just a short hop away by helicopter. He could have visited, and offered his smile and handshake and promise to cut red tape in Washington. This would have been a wonderful morale booster, knowing that he cared.

VIRGINIA HANN.

Fresno.

High loan rates irk Coalingans

By JIM STEINBERG
Bee staff writer

COALINGA — Ron Lee doesn't understand why, after the May 2 earthquake damaged his oil storage tanks, knocked out a warehouse and virtually shut down his business for three weeks, he can't get a better federal disaster loan.

The Small Business Administration offered Lee, an oil jobber who supplies farmers and other bulk users, a $36,500 loan at 10½ percent interest. He would have to repay it within three years in $1,364 monthly installments.

"I'm not able to carry on my business the way I was," Lee said Friday. "Any businessman who needs to pay an extra $1,300 per month after a disaster — I'm not crazy about that!"

Lee feels penalized because he was successful in his business while others, less successful, have access to better SBA loans.

It can mean the difference between an 8 percent loan paid back over 20 years and a 10½ percent loan repaid within three years.

Latest SBA statistics in Sacramento show 78 business loans approved in Coalinga since the earthquake for a total of $5.1 million and 252 home loans for $3.1 million.

But Lee and other business owners are turning down the SBA offers.

"I'm not trying to get a loan for myself right now," he said. "I'm trying to rectify this for others, like flood victims in Texas or whatever.

"I don't begrudge people who are getting better loans. I don't want to be given anything, but I do want to be in a position where I can pay the money back. Make it reasonable!"

In fact, Lee was upset enough to write letters to President Reagan, his legislators, congressman and senators.

One who received his letter, Rep. Tony Coelho, D-Merced, helped make arrangements for other Coalinga business owners and officials who will testify Thursday in Nevada.

They will appear during a special hearing of the Subcommittee on Investigations and Oversight of the House Science and Technology Committee. The committee will take testimony about flood and earthquake relief and its problems.

Those problems are severe and the policies unfair, Lee and other Coalinga business owners say. They are particularly angry at the SBA.

But most have refined their anger and now aim criticism at the law governing SBA disaster loan decisions.

Bernard Kulik, deputy SBA associate administrator for disaster assistance in Washington, concedes that loan rates and terms differ according to applicants' assets. But he said that is the way Congress wrote the law as passed in the 1981 Omnibus Budget Reconciliation Act.

The act changed SBA interest rates and terms and tied them to disaster victims' ability to obtain financing elsewhere. A more successful business owner has a better chance to obtain private financing, so the SBA offers him poorer terms.

A merchant operating a marginal business has a poorer chance to get a private loan. The SBA gives him better terms.

The interest rate for businesses with access to private credit is tied to the prime interest rate, and the law requires repayment within three years.

"That [the three-year payment] is the biggest problem," Kulik said, "and we have no discretion if credit is available elsewhere."

The SBA looks at applicants' cash flow for the next three years, whether they have business assets qualifying them for private financing and whether the principal owner has sufficient assets, including personal assets, to satisfy private lenders.

If he can get private loans, Kulik said, the law sets out that "the best we can make is the prime interest rate loan payable within three years."

All SBA loans over $5,000 require collateral, and Lee complained that an SBA plan could result in a lien on his property, endangering his prospects for obtaining additional financing elsewhere.

There have been many SBA interest rates over the last 15 years, Kulik said, adding that legislation is pending to reduce them again. Federal loan rates were once just 1 percent.

Rep. Parren J. Mitchell, D-Md., chairman of the House Committee on Small Business, has written Coelho of "the onerous terms of SBA's current disaster loan program."

But Kulik and other SBA officials respond that the Congress in 1981, featuring a Democratic majority in the House, passed the law that set those terms.

Mitchell wrote that the Reagan administration "would prefer eliminating all assistance to businesses such as Mr. Lee's." He said the administration accepted the present law knowing it would have "no fiscal impact because businesses would not accept such terms."

Lee didn't accept them in Coalinga, and Jack Kemper, owner of Lacy's Cafe, destroyed on May 2, may not, either. But they aren't interested in Republican-Democratic countercharges. They want to change the law.

"It's a bunch of baloney," Kemper said. "My whole gripe is the law, which makes no provisions for a real disaster.

"The loan rate used to be 3 percent. Now it's 8. Someone already in debt has a rough time taking on another debt, and that's my situation."

Kemper plans to testify in Boulder City, Nev., on Thursday.

"I don't know who to blame," he said. "People in business pay taxes and hire others. The bottom falls out, and there is absolutely no help."

He complained, jokingly, about the unfairness of his situation.

"I think we ought to declare war on the United States and let them win. The United States would pay us millions! We send billions of dollars all over the world, including to countries that aren't even friendly. Here we get nothing."

Pharmacist Jim Wood, now operating his May Drug in what used to be the St. Paul's Catholic Church reading room, has been offered a 20-year loan at 12 percent.

He leased his old pharmacy property before it was destroyed and didn't have the equity in his business that Lee had in his. Even though Wood has been offered more favorable terms than Lee, he is "disgusted" with federal disaster relief policies.

"When they first came to town days after the earthquake, the federal and state boys said that help would come right in. We're wiped out in 30 seconds, but nothing much came."

THE FRESNO BEE
Saturday, October 8, 1983

Statement Before

SUBCOMMITTEE ON INVESTIGATION AND OVERSIGHT

HOUSE COMMITTEE ON SCIENCE AND TECHNOLOGY

By

John G. Kemper
Coalinga, California

Honorable Albert Gore, Chairman, and Mr. Harry Reid, M.C.

It has been five months since the devastating earthquake of May 2nd demolished a major portion of the downtown business district and hundreds of homes in Coalinga. I feel it is time for me to let you know how this catastrophe has and is affecting a 56 year old former businessman; taxpayer; veteran of two wars; father of five with the three youngest enrolled in colleges this year; and presently unemployed.

Our family owned and operated a successful restaurant and catering business in Coalinga. We employed 20 people. Our 6,500 square foot facilities had a seating capacity of 200 persons. Lacey's Cafe had been in business since 1948. We owned it since 1977. Our restaurant was well known by travellers throughout the San Joaquin Valley and was a meeting place for the community and surrounding area. We were planning to use the income from sale of the business in future years for our retirement. Our equity and retirement are gone as are the buildings and business. Our modest savings are rapidly being depleted. We have lost the wherewithal to make a living and contribute to society other than in a personal way.

We still have a mortgage of $158,000 with an interest rate of 8 % that would have been paid off in 10 years. Until this debt is satisfied, I cannot forsee any possibility for getting back into business in our own facility. Even if we did not have this obligation, increased costs of new construction will require a loan of approximately $390,000 (to rebuild only 4,500 square feet) at an SBA interest rate of 8%. To be able to use the SBA loan approved, we would have to provide almost $60,000 cash on our own. Monthly payments would increase from $1,777 (10 years remaining) to $2,571 (for a period of 25 years). There is considerable doubt that we could afford to pay the increased amount every month from revenues generated from a facility 1,500 square feet smaller. And - if we can not get out from under our present obligation, our monthly payments would be $4,248 - an amount impossible to repay.

YES, we thought we were fully covered by our insurance but learned that earthquakes were not included.

So much for my personal problems. I cannot understand why governmental agencies (SBA, for example) must use the same criteria for a Federal Disaster rebuilding program that they use for regular situations. I understand that CBDG grants are made available to people who have desperate housing need at even no interest. Liens are placed on the property for the amount of the loan. Why doesn't or couldn't a similar program be made available for small businessman? Developers for Farmers Home are given grants or 1% loans so that providing housing becomes feasible. Desperate needs for grants or 1% interest loans will exist after future major disasters - why not now? If this were possible, many small businesses could get back into business. They would hire and pay employees thus reducing unemployment. Income taxes (State and Federal) and spendable income would result. We could generate profit dollars upon which taxes are paid and, hopefully, stimulate community growth with a resultant improvement in the economy of our community, county, state and nation.

Immediately after the May 2nd earthquake, we were deluged with representatives from innumerable governmental agencies - all of them telling us what good things they were going to do to get us going again. A great many of them were never heard from again. Of those that did re-appear, many have offered nothing more than lip service. I have already mentioned SBA's lack of a disaster program. UDAG talks a lot but doesn't seem to have much to offer. They sent two people to Coalinga and spent several hours gathering information from a large group of property owners and businessmen. After this meeting, I was asked to spend another hour with them in a private conference to discuss in detail my own situation and needs. Neither of them has been heard from since. A representative of Farmer's Home arrived two days after the quake. He told of funds available at 1% interest. In addition, he knew of other agencies that had money for this type of thing. As far as I know, we've never heard from or seen him since. Funds were requested from EDA for construction of buildings downtown for use by businesses to get them going again. It took literally months for EDA to approve this request which came through a day or so before the end of the federal fiscal year.

Since it was announced that I would be appearing before this committee, several of our community leaders have asked me to mention some of their concerns or "gripes".

> Jim Lam - City Councilman and Mayor Pro-Tem is upset that the Federal people took all motel rooms within fifty miles. They all wanted single rooms and were each on $90 per diem. No rooms remained available for those that lost their houses or people who came to be with and assist them.
>
> Bob Cassio - Pres. of Allen Ranches and City Councilman had several concerns.
>
> A. There is a 100 day period to file certain claims after being declared a disaster. Floods may take 3 to 6 months to clean-up, re-construct and engineer.

Earthquakes are followed by after-shocks and after-quakes (some of which including the July 21st earthquake do as much or more damage than did the original). No extension of the original 100-day period is provided for. Rules must be flexible enough to provide needed assistance.

B. When you talk to Federal Agencies regarding loans or grants, they talk like they are trying to keep crooks from "ripping-off" the system rather than helping those in need to get assistance.

C. Federal Disasters mean nothing as far as help for the individual. Even now I'm certain that people who have not experienced a disaster think government is going to help; think there is low interest financing available; are lulled into a false sense of hope. Then - FEMA arrives and they learn that FEMA can't loan or provide funds and other agencies don't have an ability to help. The bubble bursts. Anxiety, frustration and even apathy set in.

I realize that statistics are the "spinal cord" of many governmental agencies and are used to point out the volume of their work and what good things they do as well as assist in justifying their agencies continued existence. Many of these statistics are "honest fabrications". Mr. Cassio investigated the cases of 12 people in Coalinga who had been verified for an SBA loan. None of these 12 has taken up the SBA on their offer of a loan. Why? Is it because they didn't know that loan terms could be changed? Is it because they didn't know the procedures to request additional funds? Is it because they didn't know they could "roll-over" an existing loan into a new SBA loan? Is it because some loans carry such a short re-payment term? A much higher percentage of people would take advantage of loans offered if they really had the programs explained so that they could understand their options.

If I were head of SBA and statistics were presented constantly that showed an extremely high percent of non-acceptances, I would certainly become concerned and do some investigation of the circumstances and reasons why. I can recall several weeks after the earthquake the cries of SBA that they had given out over 300 packets of information and had only received a handful of applications. Doesn't that tell you something? It tells me something. It tells me that people did not understand. It tells me that people were overwhelmed with the paper-work and research details required. It tells me that when handed a pile of papers with the top one (Fact Sheet - Disaster Loans) showing the lowest possible business loan at 8% - you just plain get "turned off". This you don't need in a time of crisis.

Having observed a major disaster, I have a suggestion that can benefit others in the future. A truly professional Disaster Team or Teams (okay if headed by FEMA) made up of knowledgeable representatives from other agencies should be developed - all of whom are trained, intelligent individuals who understand and have knowledge of all agencies abilities to assist. This Disaster Team or Teams must be ready to go where needed and be accompanied by trained specialists in all areas. The Disaster Teams and their managing Agency must be allowed some flexibilities to permit the providing of services; loans; grants; etc. in verying circumstances which are present after different types of disasters.

For the record, I would like to thank several organizations (unfortunately not all governmental agencies) who assisted beyond expectations and who are all forever in the hearts of the citizens of Coalinga. These organizations performed without pay; without paperwork; without questions and without making you feel that they were doing you a favor to be of service. They include (in no specific order) :

Salvation Army
Mennonite Disaster Services
Coalinga Disaster Christian Response
American Red Cross
California Conservation Corps

These are the people who know how to help after a disaster occurs.

Gentlemen: I realize this is probably not the proper forum but how can we continue to justify sending billions of dollars to foreign nations, many of whom are not even friendly to the United States, and continue to ignore the desperate needs of our own citizens who have worked and paid their taxes for many years?

Thank you for this opportunity to address the Sub-Committee.

Mr. REID. I agree with both of your testimonies. I think when I first got started on these hearings, I thought as everyone else had, I heard on the radio or read in the newspaper the President had declared the disaster and that in fact, wheels of progress would take effect.

But testimony we have heard time and time again now, after 3 days of hearings, that that is not how it works.

I think if we certainly have made that system, I am extremely concerned [inaudible.]

I think our minds can imagine what would have happened had this been a few miles one way or the other and would have been just chaos for us all. So the purpose of this hearing and the testimony—and I appreciate you coming here—is to alert the Congress, alert the American public, that we have got to do a better job to be able to handle major disasters.

Major disasters are certainly going to come [inaudible.]

Congressman McCandless?

Mr. MCCANDLESS. [Inaudible.]

Mr. REID. Congressman, the reporter can't hear.

Mr. MCCANDLESS. I want you to know that I am not unsympathetic to your problem. In both your testimonies, there are two categories and I want you to share with me if you will, your reactions and thoughts on these categories.

The first category I received was what FEMA could have done and it didn't do as government agencies on the spot at the time.

Second category was what you would like to see an agency like FEMA have in the way of resources and legal prerogatives such as the situation that they currently do not have.

I will use the example of your 1-percent loan for Farmers' Home Loan, housing, and your comment about the 8 percent, and I would like your reaction on the two sections of your testimony.

Mr. DAPELO. Congressman, I will respond to you. I will respond to you initially.

The first question of your direction, it is not my intent to criticize FEMA's operation on the spot initially when they came. I thought—and the feeling of our city council and city manager—that they responded very quickly. They were supposed to be there to help us and later on when we ran [inaudible.]

About the fact that we had an additional earthquake 84 days later, I think we have proof that we did, that will be my criticism of FEMA.

Mr. MCCANDLESS. What was the posture of the State disaster preparedness office relative to this earthquake 84 days after?

Mr. DAPELO. My recollection is they were aware in the State of the past system of the city, of Coalinga. A $5 million piece of legislation was passed and became law about two weeks ago. Of that piece of legislation there, commented concern with the precedent that might be set. [Inaudible.]

Mr. MCCANDLESS. I want to address the issue on the State modification.

Mr. DAPELO. Absolutely.

Mr. KEMPER. Let me add something to that. I was made aware of one of the prime reasons for the office of emergency service fighting the award is because they had no money in their budget to administer the funds. I don't know who can forecast these kind of disasters, but that was part of their problem.

Mr. McCandless. Comment on the second part of the question.

Mr. Kemper. I would like to comment a little bit on it. I think I touched on it in my testimony too, that every disaster has different problems connected with it. They are located in different areas, going to be an earthquake, one might be a tornado, could be anything.

One of the things that bothers our city council members to no end is the fact that when FEMA came in and all of the agencies involved, they proceeded to occupy every available living space, every motel and hotel within 50 miles around.

As a result people whose houses collapsed had no place to live, had no place to go, and people came to help them out had no place to stay.

I could understand why that might be a real problem in our area but might not be in a large metropolitan area like Las Vegas. But that was one.

The other part of your question, I think I also touched on. I think that FEMA or whoever would be the head of a disaster agency or coordinating agencies should really have flexibilities. Right now, it appears that each of the agencies that FEMA is trying to coordinate has its own guidelines, its own set of rules it goes by, and one agency might not mesh or meld with another's in order to accomplish a given end.

I think there has to be some strong teamwork or agencies developed in order to be able to mesh all these together so they really accomplish what everybody hopes they might accomplish.

Mr. McCandless. Thank you.

Mr. Reid. Congressman Durbin?

Mr. Durbin. Thank you very much.

I would like to comment to these two witnesses. It really takes a lot of abstract theory and discussion to bring it down to the real world, and it is very helpful to us as we travel around the country to pick up this information.

Mr. Kemper, I think your suggestion about teamwork is really a good one. More and more we have found so many different Federal agencies attempting to address a small part of the problem, and many times forget the others doing it and don't end up communicating many times and in fact, people like yourself indicate the communities had been hard hit by this disaster.

One thing about your testimony I found interesting, bottom of the first page, one sentence paragraph which summarizes the whole reason you are here today, and that reason is when you had this disaster hit your businesses, you obviously called your local insurance man and said: Well, I will give you the amount of damage assessment and he told you, I am sorry, you are not covered.

I assume that you believed that you had earthquake insurance up to that point; is that correct?

Mr. Kemper. Congressman, when I opened business in 1977, I sent in my—this is all part of litigation—I said to my insurance agent that I wanted to be covered, I didn't want any problems, and so forth, and so on.

Well, couple of years ago, a bolt went through a window and so, I called him up to find out how to get the window fixed and found out I didn't have glass breaking insurance.

Now, when we had an earthquake, I find out that I am not insured for earthquake, and I didn't have to call the adjuster, he came out the following day to my home. I was having a plumber repair a broken pipe in the house as a result of the earthquake, and he told me that I didn't have earthquake insurance.

Mr. **Durbin**. Doesn't sound like——

Mr. **Kemper**. He didn't do much either.

Mr. **Durbin**. Do you feel or do you know whether or not earthquake protection is available through insurance policies in your area? Can you buy it?

Mr. **Kemper**. You could for a while. I understand at this point it is not available.

Mr. **Durbin**. Let me suggest to Congressman Reid, in my home State of Illinois we have tremors but very little damage. Our concern is that coal mines in the communities will collapse and in so doing, houses will sink underground with considerable damage.

We have mandated property insurance to offer that kind of protection to homeowners in the area of coal mines. This may be the State issue, not a Federal issue.

But as you consider all the things we have learned from it, I hope you will talk to your State legislators as well. Mandatory coverage for that type of a loss from earthquake damage [inaudible] companies wanting to write that coverage in the future.

Let me mention a couple of other points. I guess by way of observation, when we are faced with a challenge in Washington of reducing the Federal deficit, almost $200 billion, we attempt to cut back in spending on domestic programs.

I go to town meetings in my home area, citizens come up to me and say: When my checkbook is not balanced, I just stop spending, why don't you stop spending in Washington? So we step back on domestic agencies.

Some of the problems that you experienced as a result of this earthquake were directly related to decisions made in Congress in the last year or two to cut back on these disaster programs. When you talk in the abstract about balancing the budget, everybody is for it.

When you talk about the impact it is going to have on people and their problems, then you see the human side of this equation.

And I hope that our latest appropriation bill, which increases the appropriation for disaster loans, will at least provide some refuge in the future to people who are affected by this.

This is one of the political aspects of it and I hope it is part of the record.

Finally, let me say this, in my town meetings I always run into people who say charity should begin at home; why do we give all of this money to all of these other countries?

I have learned in the short time I have been in Washington that much of this financial assistance to other countries is very selfish. We provide credit to other countries so they can buy the produce of the farms of California and farms of Illinois.

We provide military assistance so we can send guns instead of our sons and brothers. It is a very difficult choice to make, I hope that we will keep in perspective that there is a valid purpose to be served there.

That is not to diminish one bit that you are deserving or should have better help than you have received from the Federal Government. And I appreciate both of your testimonies very much.

Mr. DAPELO. Congressman, may I suggest something, in the five suggestions that I enumerated in my written presentation, if you have the opportunity to read them, I don't think you will find in any case that we asked for any handout.

The only situation that might affect the budget when we were talking about low interest loans. All of the other things we suggested are in no way a handout.

Mr. DURBIN. Well, the low interest loans are, of course, subsidy from the Federal Government to the credit system of this country rather than to have you go through the private market. And I can understand that we do that in extraordinary circumstances and I think it is right.

Perhaps the national earthquake insurance program would call for some involvement of the Federal Government, but I appreciate the fact that you are trying to do it without a great new agency being created.

I thank you very much.

Mr. REID. Congressman Dymally?

Mr. DYMALLY. Thank you very much, Mr. Chairman.

First I want to welcome my fellow Californians and to impress upon them their appearance here is a meaningful one and I am sure has some effect on the kind of decision that comes out of it.

I would like to tell Mr. Kemper, I had lunch in his restaurant many years ago when I was in the Central Valley. Your testimony was very moving. It seems, if nothing else comes out of these hearings, we should have some Federal guarantees for earthquake disasters.

I find it very difficult to comprehend disasters such as you find, your business.

You still carry the mortgage for damaged property which I think—you are now paying the mortgage on flat land?

Mr. KEMPER. That is correct.

Mr. DYMALLY. Cost is prohibitive to build, even the cost of labor and material, and it seems to me the only solution to this problem is a Federal insurance earthquake program. And I hope, in addition to my colleague in California, at least you agree on making this recommendtion to Congress, those of us from California constantly are faced with.

One time it was Imperial Valley, now San Fernando Valley, and now we have the central part of southern California. It is disturbing to a number of Americans to see the speed in which we respond to overseas disasters and yet bureaucracy engulfs us in the United States. It is so discouraging and leaves us so totally helpless that we have no alternative but to be critical of such a hesitant response when our citizens find themselves in a disaster such as you. And I don't think it is any consolation to Californians to make promises.

I do hope that if nothing else, we do make some specific recommendations to the full committee and hopefully to Congress at the end of this session here, so we can take it up next year to provide some relief for those of you who are suffering now in Coalinga and future disasters that will occur in California.

Mr. REID. Thank you, Congressman Dymally.

Mr. McCandless?

Mr. MCCANDLESS. Thank you.

My colleague's information is that insurance on earthquakes is available in California, and I wish [inaudible] San Andreas Fault which has earthquake insurance on it so earthquake insurance is available if the coverage is in and the ability of the person to acquire that coverage because of some [inaudible].

One other point, in reviewing the testimony you gentlemen made, do I understand you correctly that the FEMA office was responsive but the problem was one of the situation of the press, they were not administratively responsive to the fact that you were having a continuing problem that was separate from the original; and so I think we ought to look at the administrative determination of that aspect, navigate any changes such as you have experienced there.

You have had all three together?

Mr. KEMPER. There are hundreds, but there have been only four or five rather major earthquakes since the May 2 earthquake.

Mr. MCCANDLESS. Three major ones, if I understand correctly?

Mr. KEMPER. Five.

Mr. DAPELO. 5.1 on the Richter scale, at least five.

Mr. MCCANDLESS. It would appear to me that FEMA should look at it not only in terms of earthquake [inaudible] situation of flooding instead of the earthquake would be the basis for damage. We should look at and acquire something in the way of modification through the legislative process.

Mr. REID. Thank you, Mr. McCandless.

Mr. DAPELO. May I respond? Concerning the Congressman's comment about earthquake insurance being available to California, you have to realize about two kinds of earthquake insurance, residential or commercial.

Commercial earthquake insurance is not available in Coalinga at this time and has not been for 2 or 3 months. It is a coming and going type of thing, changing their minds and then changing it back. And so, at the moment, there is no earthquake insurance available on commercial buildings.

One thing I would like to ask the Congressman, certainly I agree with you what you have to say about earthquake insurance on a national level and I think it might be interesting to note that out of 10 major earthquakes since 1800, only 1 of those have occurred in the State of California.

So it is a national problem, not just a major California problem.

Mr. REID. Thank you very much for your testimony.

While our last panels are coming forward—Mr. Joe Winkle, who is the Associate Director of FEMA; and Mr. Roy Hobbs, who is from the disaster assistance program of the Small Business Administration—while they are coming up and setting up, I would like to introduce my colleague, Howard Nielson, who just arrived in the Las Vegas area, and immediately came to this area.

Congressman Nielson, being a Ph.D. in statistics, he will add a perspective to the investigative questioning that we simply do not have. Welcome here, Howard.

Would you please introduce who is here, and I would indicate to you that we want to complete these hearings by 1:15 for reasons relating to the building; in fact, we have been here 3½ hours or so.

STATEMENT OF JOE WINKLE, FEDERAL EMERGENCY MANAGEMENT AGENCY, ACCOMPANIED BY JOE DELMONTE, FEDERAL COORDINATING OFFICER; AND ROY HOBBS, DISASTER ASSISTANCE PROGRAM, SMALL BUSINESS ADMINISTRATION

Mr. WINKLE. My name is Joe Winkle, I am with the Federal Emergency Management Agency, and I have two people that are with me today to respond to your questions, Mr. Joe Delmonte, who is the Federal Coordinating Officer.

Mr. REID. Would you spell that, please?

Mr. WINKLE. You can't hear me?

Mr. REID. OK, let's test that accent again.

Mr. WINKLE. I brought Mr. Delmonte from our region 9 office in San Francisco.

Mr. REID. Boy, you really do have an accent, don't you?

Mr. WINKLE. Yes, sir, I'm sorry, I do.

I have a prepared statement which I will summarize briefly for you in the interest of time, Mr. Chairman.

With your permission, I would like to touch upon two principal topics, one being the overall mandate and organization of FEMA; and second, a profile of the response that FEMA and the other agencies had as a result of the Coalinga earthquake and the Colorado River flooding of Arizona and California.

First, FEMA was organized for the purpose of bringing together a number of various Federal organizations to provide a single agency with the responsibility for coordination and administering of disaster preparedness and response and mitigation.

The disaster relief activities, of course, get most of the public attention of our Agency's activity, but we are very heavily engaged in programs that are on an ongoing basis working with the State and local and other Federal agencies as it relates to preparedness as well as efforts and opportunities for enhancing mitigation.

In the area of preparedness, there is, under the Disaster Relief Act, a provision that provides funds to the State to improve their abilities to deal with these situations.

Under a number of our other authorizations, such as civil defense program areas and earthquake authorizations, there are funds available to assist and work with State and local governments to enhance the preparedness to provide training or expertise or representative management as well as provide for public funds on State and local levels, communications.

FEMA is responsible for administering the National Flood Insurance Act, which is the Federal flood insurance program and the requirements that go along with that to provide for better information and to mitigate or use the exposure to improve. [Inaudible.]

Now, through the point of our discussion here today the area of responsibility for responding to disasters rests with the State and local government. The Disaster Relief Act of 1974, which is intended to supplement State and local efforts and resources when a disaster is of such magnitude as to be beyond their capability.

Various States have the authority to supplement the efforts of State and local governments when it is beyond their capability to deal with it.

Under the President's declaration, we have two Federal areas: One being in the area of assistance to individuals with the programs that are specifically authorized by the act in which FEMA administers as well as the responsibility for coordinating the efforts of the other Federal programs.

The other area is in the assistance to State and local government for repair and restoration of publicly owned and certain private, nonprofit facilities.

As has been mentioned in previous testimony, as the overall coordinator of Federal preparedness and response, FEMA works in conjunction with other Federal agencies with authorities and technical expertise that address a given need.

It is not for any of the parties to dictate to any Federal agencies on how they will administer their programs.

As far as the timeframe concerning the Coalinga earthquake on May 2, we had our people on the scene the following day, and on May 4 the Governor requested assistance, and on May 5 the President issued a declaration making both individual and public assistance available.

I have attached to my statement various statistics. I would like to not have to repeat those here.

As far as the Colorado River flood situation, it is quite our effort to tie up the situation. The earthquake, it was quick, it was very clear as to what the problems were and what the needs were.

In the case of the flood, it was fairly easy to identify the needs of individuals in the area of public assistance, to assist State and local governments and the requirement by the act that it must be supplemental and beyond the capabilities of the State and local governments, it took some time to be able to verify that working with the State and local governments.

As a result, it was not until September 13 in which we could verify that the requirements were beyond the capabilities of the State and local governments and the public assistance was made available.

In summation, Mr. Chairman, I would like to bring to you and this committee's attention the proposal that is before the House, H.R. 3430, that was mentioned by the gentleman from GAO.

It does pick up on their report and their findings of July 1982. It does address a number of areas of strength and to provide some additional funding in the area of preparedness.

It addresses, it affects the proposal that the assistance that is provided to State and local governments be provided on a grant which would eliminate much of the paperwork requirements that we are currently required to go through as well as derive some funding for hazard mitigation which we think really has good payoff of the taxpayer's dollar.

With that, Mr. Chairman, I would be glad to answer any questions.

Mr. Reid. I think what we will do, Mr. Winkle, is we will hear from the SBA and then ask questions because I think some of the questions are overlapping anyway, and you can both give answers.

[The prepared statement of Mr. Winkle follows:]

STATEMENT BY

JOE D. WINKLE

ASSISTANT ASSOCIATE DIRECTOR

DISASTER ASSISTANCE PROGRAMS

Mr. Chairman, thank you for inviting me to testify today. With your permission I would like to touch upon two principle issues: first, the overall mandate and organization of FEMA and its relation to State, local and other Federal agencies; second, a profile and evaluation of FEMA's response in the major disasters declared by the President for earthquake damages in Coalinga, California, as well as the Colorado River flooding in California and Arizona.

FEMA was first created to provide a single organization and reference point for the coordination and administration of Federal emergency preparedness, response and recovery assistance. While our disaster relief programs often receive the greatest public attention, FEMA is actively involved with State and local governments on a regular basis both with grants and technical assistance to help improve overall preparedness.

FEMA provides various training programs to State and local officials and emergency personnel. One of our resources for training is our facility in Emmitsburg, Maryland. In addition, programs are implemented in conjunction with State offices to enhance emergency management training.

We support State preparedness plans and programs in connection with Disaster Preparedness Improvement Grants, authorized under under Title II of the Disaster Relief Act, as well as with programs under the National Earthquake Hazards Reduction program (NEHRP).

The preparedness grants provide a maximum of $25,000 per year to be matched equally by the State. These limited funds serve a variety of purposes, including the following:

Preparation, revision and updating of State Emergency Plans

Handbooks for local officials

Preparation and updating of vulnerability analysis

Improvements to administrative guidelines for the Individual and Family Grant program and the Temporary Housing program

Test of warning and communications systems

Review of county preparedness plans, and the provision of technical assistance to local planners

Development of plans and guidelines for pre-disaster hazard evaluation and mitigation planning

We would note that this program specifically addresses State level preparedness. The history of the program has proven its worth in an improved level of capability on the part of States to respond to potential or actual disasters. FEMA hopes to provide even greater support to this program in the future through increased financial assistance.

Under the Earthquake Hazards Reduction Act of 1977, funds and technical assistance are avaailable to State and local governments to prepare special or additional plans that recognize the earthquake threat in high-risk, high-population areas. The objective of the program is to develop capabilities, at all levels of government, for achieving integrated preparedness and response to the threat or consequences of severe earthquakes to the extent that regular emergency preparedness measures are insufficient for earthquake contingencies. Funds are provided based on the best accepted, scientifically credible state-of-the-art threat assessment using population-at-risk, potential loss of life, property damage, and probability for the maximum credible event. Vulnerability assessment, response planning, public awareness, and mitigation programs are underway or targeted for high risk areas.

Under the authorities of PL 93-288, and under other authorities addressing floodplain management, we have steadily pursued and sought to strengthen hazard mitigation efforts that will produce long-range benefits for the communities involved in terms of reduced damages in future disaters, as well as related savings to all levels of government.

Hazard mitigation represents an approach to emergency management that examines the measures that may be taken to build up resistance to certain predictable types of damages from natural hazards. Especially in flood prone areas, the involvement under the Disaster Relief Act and provisions of the National Flood Insurance Act of 1968, as amended, involve planning and technical assistance for States, as well as - pursuant to a Major Disaster Declaration - advice on ways that the repair, restoration and reconstruction of public facilities can include measures to reduce future damages. Other structures in the same area that may not have been damaged in a given disaster but remain highly vulnerable are not currently eligible for such assistance. Also, under current authorities, FEMA seeks to reduce future damages by pursuing these principles through three other channels. First, hazard mitigation teams coordinate the Federal response to assure that actions being taken by various agencies contribute wherever possible to hazard mitigation in a coordinated manner.

Second, Section 406 of the Disaster Relief Act requires as a condition of assistance that States take actions (for example, concerning land use or construction practices) that will help reduce future losses. Finally, under Executive Order 11988, FEMA has oversight responsibility to insure that all Federal agencies avoid taking actions that would create vulnerability in the flood plain, or, if actions have no alternative location, to insure that agencies make appropriate action to minimize potential impacts.

The primary responsibility for responding to disasters rests with State and local government. The Disaster Relief Act is intended to supplement State and local efforts and resources when a disaster is of such magnitude as to be beyond their capability. When a disaster occurs and the President has made a declaration authorizing assistance under the Disaster Relief Act, FEMA may provide individual and public assistance to support recovery from the results of the disaster. The precise programs made available depend upon the particular characteristics of each disaster, including Public Assistance to State and local governments for the repair and restoration of publicly-owned and certain private, non-profit facilities, and Individual Assistance which may include temporary housing, grants to address certain disaster-related costs, and disaster unemployment assistance.

As the overall coordinator for Federal preparedness and response, FEMA works in conjunction with other Federal agencies with authorities and technical expertise that address a given need. FEMA itself does not administer the programs of other Federal agencies that are activated in this way, nor do we attempt to duplicate their technical resources. As a coordinator we seek to insure that all foreseeable needs have been recognized, that the appropriate available programs are brought into play to address those needs, and that the parties responsible for providing assistance are informed of the various elements of the response effort in order to insure expeditious delivery of assistance and to prevent duplication of that assistance. For those programs offered by other Federal agencies under their own authorities (but in coordination with FEMA), those agencies are responsible for all aspects of the processing of that assistance, and for exercising the necessary oversight to guarantee timely response.

Mr. Chairman, I have attached to my testimony some figures giving estimates by program of the assistance provided in the Colorado River flooding for both Arizona and California as well as for the earthquake damages in Coalinga, California (see Attachment A). At this point I would like to summarize briefly the succession of events in those disasters to give a better picture of FEMA's role in the response and an overall evaluation of that response.

The earthquake in Coalinga occurred on May 2nd. Our teams performed a damage assessment the following day. On May 4th the Governor requested assistance and on May 5th the President issued a declaration making both Individual and Public Assistance available. The field office remained open until June 30th. 512 people have been provided temporary housing; 585 have applied for Individual and Family Grants with 243 approved, another 100 either withdrawn or determined ineligible and 238 cases awaiting decisions by the State which administers this program. Approximately $3.2M was approved in Public Assistance.

The Colorado flooding situation presented and continues to present quite different problems. Unlike the swiftness of the earthquake, which even including aftershocks was a comparatively brief event, the flooding developed as a result of many interrelated causes and while the causes of the most severe flooding have passed, high water and associated problems continue in the Yuma area.

FEMA began monitoring the situation as early as May 26th based upon information received from the National Weather Service. In mid-June when the prospect of severe flooding was imminent, FEMA Headquarters received its first formal reports from FEMA Region IX which were based on contacts with the Bureau of Reclamation and the National Weather Service. FEMA regional personnel at this time were in daily contact with the affected States. While FEMA coordinated activities with the other Federal agencies involved, we did not, as was noted earlier, direct or assume responsibility for those areas under their jurisdiction or within their technical expertise. A chronology of the events involving FEMA and disaster assistance is attached (see Attachment B).

FEMA Region IX personnel were on the scene in Arizona two days prior to receipt of the Governor's request for individual assistance on June 25, 1983. On June 24, 25 and 26, Federal/State teams assessed the damages in both Arizona and California.

The initial assessment of the actual damages was complicated due to the problem of high water which made it difficult to certify the nature and extent of the damage. However, throughout this time FEMA personnel both in the region and headquarters made every effort to be responsive to the real needs in the affected area.

On June 28, the Governor of California's request, also for individual assistance, was received. By July 1, the recommendation had been prepared and sent to the White House and the President declared a major disaster in both States. Individual assistance was authorized for three counties in each State. Disaster Assistance Centers (DACs) were opened July 6. FEMA registered 665 people in Arizona and 340 in California.

Of the 550 residences estimated to have been affected in both States, 323 families applied for temporary housing. Of these, 123 were determined eligible and accepted assistance. The first families were housed on July 10 in Arizona and July 11th in California.

At the same time, other programs represented in the DACs were taking applications and providing assistance such as Small Business Administration disaster loans, the Individual and Family Grant Program, Disaster Unemployment Assistance, and Department of Agriculture flood stamps and emergency loans.

On July 14 and 15, in response to verbal requests from State officials, FEMA/State teams attempted to assess damages to public facilities. Both Governors were notified that due to standing water, it was impossible to approve or deny Public Assistance. FEMA agreed to reassess the situation as soon as conditions were favorable, and a team of FEMA headquarters and regional perosnnel again surveyed the area during the week of

September 13. Although many facilities were and still are under water, public assistance was approved for all three counties in each State on September 16.

Applicants' briefings were held on September 22 and 23, and notices of interest were received from 16 applicants in Arizona and 13 in California. Teams began developing Damage Survey Reports on September 24 and completed them on October 11. Funds were transferred to the States via letter of credit by the end of September. Some facilities in each State are still under water and will be inspected at the earliest possible time.

Also, FEMA contracted for the expert services of a hydro-geologist who visited Yuma, Arizona, on October 4, 5 and 6 to provide technical assistance and an evaluation of the ground-water problem as it relates to public facilities.

In summation, Mr. Chairman, I would merely reaffirm that FEMA personnel worked to the utmost in each of these situations to insure thorough and fair evaluations of need, and efficient, timely delivery of assistance once it was approved.

After nine years of implementing the Disaster Relief Act, we feel that the Act is a sound vehicle for administering appropriate Federal relief, allowing flexibility according to the needs of a given disaster, as well as reasonable limits.

However, we feel that certain programs and elements of the Act could be strengthened. Accordingly we have proposed amendments to the Act which have been introduced in the House as H.R. 3430. I would be happy to have the opportunity to discuss this important legislation in detail with you. In the interests of time, I would simply note now that we are proposing a doubling in the current level of the Preparedness Improvement Grants, and new funding for hazard mitigation projects. These proposals would further support the policies and programs outlined at the beginning of my statement. We believe that all these programs have demonstrated their value. They hold the promise of improved delivery of required assistance and the prospect of significantly reduced future damages. This will mean a correspondingly reduced level of disaster relief costs for a relatively low initial investment by the Federal and State governments. Another significant amendment expanding our present project grant procedures would allow a streamlined processing of much public assistance that would eliminate a large volume of paperwork and speed the delivery of funds to State and local applicants.

Mr. Chairman, we would encourage and request that you and your fellow Committee members grant favorable consideration to these proposals at such time as they are before you in the House.

This concludes my formal statement and I would now be happy to answer any questions you may have on these matters.

Attachment A

DISASTER ASSISTANCE

			COLORADO RIVER FLOODING	
		COALINGA, CALIFORNIA	ARIZONA	CALIFORNIA
DAC Registrations		2427	665	340
Temp. Housing	#	512	95	28
	$	1.6M	200,000 obl. to date	100,000 obl. to date
IFG		281 apps. appv. 183 aps. pending	54 apps. rec'd 48 pending	46 apps rec'd 34 pending 6 approved
SBA	#	330	139	45
	$	8.2M	$4.5M	$450,000
Public Assistance		$3.2M	$1.017M	$700,000 (to date) (approx)

Attachment B

COLORADO RIVER FLOODING

Arizona 686-DR California 687-DR

June 17 - Region IX submits report detailing activities by OFAs and Red Cross. Report made part of the daily EICC summary.

June 22 - Briefing by Bureau of Reclamation on Capitol Hill for Members of Congress and staff, attended also by FEMA HQ personnel.

June 23, 1983 - BuRec. press releases on controlled releases at dams.

- Regional personnel in field.

June 24 - Arizona Governor sends request to FEMA for IA in Mohave, LaPaz and Yuma Counties.

June 25 - Request received in FEMA Region IX.

June 24, 25, 26 - Federal/State damage assessment complicated by standing water.

June 27 - BuRec. Commissioner briefs Members of Congress and staffs.

June 28 - California Governor requests IA only for Imperial, Riverside, San Bernardino Counties.

June 29 - Regional recommendations for Arizona and California received in Headquarters.

June 30 - Meeting in Washington, D.C. FEMA, BuRec, COE, NWS concerning continuine releases and flooding.

July 1 - Declaration by President for both States. IA approved for three counties in each State.

July 14-15 - In response to verbal requests from State officials, teams do assessment for Public Assistance in both States.

July 19 - Written Requests for Public Assistance received.

July 20 - Regional assessments sent to HQ saying assessments too difficult because most facilities still inundated.

August 17 - Governor of Arizona reiterates need for Public Assistance.

August 23 - Governors told by telegram, (from R.IX) that their requests for Public Assistance have not been denied, but no decision can be made until verifiable survey can be done.

August 30 - Governor of Arizona protests delays in making decision.

September 16 - Public Assistance added both States - three counties in each.

Mr. REID. Mr. Belloni?

STATEMENT OF ROBERT L. BELLONI, AREA DIRECTOR, DISASTER AREA 4, U.S. SMALL BUSINESS ADMINISTRATION, ACCOMPANIED BY RICHARD J. MOSER, AREA COUNSEL, DISASTER AREA 4, U.S. SMALL BUSINESS ADMINISTRATION

Mr. BELLONI. I started to say good morning, but I guess it is good afternoon.

Good afternoon, Mr. Chairman, members of the committee. I am Robert Belloni, I am area director, disaster area 4, U.S. Small Business Administration.

I have with me here this morning, Mr. Richard Moser, who is area counsel from my office. He has come to help me with the testimony in the event we get involved in legal issues.

Disaster area 4 covers the 14 Western States and accordingly, the Colorado River flooding and Coalinga earthquake both fall within my jurisdiction. I have prepared a short statement for the record here, and I would like to read it.

As you are aware, the Small Business Administration has many programs dealing with the business community. It is only in time of disaster that it has this special authority to deal with disaster lending.

The agency has authority of its own and therefore can declare disasters on its own. At the same time, the agency responds to Presidential declarations in a similar manner. When we have Presidential declarations, such as we had in Coalinga and on the Colorado River, we respond by providing staff to man the disaster assistance centers set up through FEMA's efforts, interviewing disaster victims, providing them with program information, as much information as we can provide, and giving them the necessary application forms to fill out.

Understand here that our program is basically a loan program. The loans are different from grants in that they must be repaid. One of our charters is we have to look for repayment ability.

We give out the applications at that time, and that essentially ends our involvement until such time as we get an application back from a disaster victim. Then we process that application and determine the credit and ultimately decided whether or not we will or won't be issuing a loan.

In time of Presidential declared disasters there is another aspect that does some up and that is that there is, in some States, an individual and family grant program that becomes available to homeowners, renters, nonbusiness disaster victims.

In our interviews at these disaster assistance centers, we make every effort to make an upfront decision wherever possible to evaluate any prospects for repayment ability. Those individuals who we determine to be unable to repay are immediately eligible for and referred to the disaster grant program, the individual and family grant program.

Other than that, we have only one or two other roles and one of them is to participate in mitigation efforts and our mitigation responsibility here is very limited. We participate with FEMA in these hazard mitigation studies. It involves postdisaster studies to determine basically what could be done now to prevent reoccurrence, which is basically the reason for this hearing.

But in addition to that, we provide, in some instances, funds for relocating disaster victims, be they homeowners or business people alike. These funds are available to relocate wherein it is impractical or infeasible to reestablish the business or home in the present location.

Third, we require strict compliance with the Flood Disaster Protection Act of 1973 as a condition of our loans. That particular act requires that we as a condition of making the loan cause the purchase of flood insurance so long as the victim is in a designated flood hazard area, we also throw in a condition when he is not in a flood hazard area that if that property ever becomes such an area that insurance must be obtained. That represents the extent of the mitigation effort that we have in our charter.

With respect to the Colorado River flooding, I realize that there was some discussion earlier about interest rates, but I thought we would talk about that for a second. Maybe I should tell you basically what our loan limits are. We can loan up to about $55,000 for homeowners and as much as $500,000 for business people.

The interest rates vary with the particular disaster and there in that range, I think for the Colorado River, they were 5⅝ and 8 percent were the low rates for homes and businesses.

With respect to the Colorado River, I would say I had some statistics here and I realize we didn't have a prepared statement given to you in advance, but there were two declarations made in this particular instance. On the Arizona side, we interviewed only a total of 849 victims there and on the California side, it was only 343.

We referred very few people to the grant program because there seemed to be apparent means to repay loans. On the Arizona side, we referred 63 people to the grant program and on the California side, we only referred 57 people.

[The following information was received for the record:]

COLORADO RIVER FLOOD

Declaration No: 209706 (Phys) Declaration Date: 7/1/83 Deadline Date: 9/2/83
607800 (EIDL) 7/1/83 4/2/84

State: California Counties: Imperial, Riverside & San Bernardino

Significant Actions	Total		Home		Business		EIDL	
	#	$ (000)	#	$ (000)	#	$ (000)	#	$ (000)
Interviews Conducted	342	N/A	218	N/A	54	N/A	70	N/A
Referrals To IFG	57	N/A	57	N/A	N/A	N/A	N/A	N/A
Applications Accepted	60	6,442	24	254	21	3,526	15	2,662
Applications Processed	28	N/A	14	N/A	6	N/A	8	N/A
Loans Approved	9	759	2	28	3	506	4	225
Loans Disbursed (*)	--	--	--	--	--	--	--	--

(*) Includes N/A loans which have had initial disbursement only.

Notes:
1. 47 percent of applications accepted have been processed.
2. 32 percent of applications processed have been approved as loans.
3. 45 percent of loans were made at low rate of interest.
4. All data are as of 9/29/83 .

COLORADO RIVER FLOOD

Declaration No: 209806 (Phys)
607900 (EIDL)

Declaration Date: 7/1/83
7/1/83

Deadline Date: 9/2/83
4/2/84

State: Arizona

Counties: Lapaz, Mohave & Yuma

Significant Actions	Total		Home		Business		EIDL	
	#	$ (000)	#	$ (000)	#	$ (000)	#	$ (000)
Interviews Conducted	845	N/A	352	N/A	167	N/A	326	N/A
Referrals To IFG	63	N/A	63	N/A	N/A	N/A	N/A	N/A
Applications Accepted	173	11,146	92	2,384	44	4,120	37	4,642
Applications Processed	74	N/A	36	N/A	12	N/A	26	N/A
Loans Approved	18	320	9	129	2	60	7	131
Loans Disbursed (*)	3	13	2	9	---	---	1	4

(*) Includes 1 loans which have had initial disbursement only.

Notes:
1. 43 percent of applications accepted have been processed.
2. 24 percent of applications processed have been approved as loans.
3. 78 percent of loans were made at low rate of interest.
4. All data are as of 9/29/83 .

COALINGA EARTHQUAKE

Declaration No: 208402 (Phys) Declaration Date: 5/5/83 Deadline Date: 7/5/83
606300 (EIDL) 5/5/83 1/5/84

State: California Counties: Fresno & Kings

Significant Actions	Total		Home		Business		EIDL	
	#	$ (000)	#	$ (000)	#	$ (000)	#	$ (000)
Interviews Conducted	2,285	N/A	1,918	N/A	328	N/A	39	N/A
Referrals To IFG	545	N/A	545	N/A	N/A	N/A	N/A	N/A
Applications Accepted	509	19,273	379	6,042	126	13,147	4	84
Applications Processed	509	N/A	379	N/A	126	N/A	4	N/A
Loans Approved	328	8,248	252	3,165	76	5,083	--	--
Loans Disbursed (*)	148	1,160	127	922	21	238	--	--

(*) Includes 60 loans which have had initial disbursement only.

Notes:
1. 100 percent of applications accepted have been processed.
2. 64 percent of applications processed have been approved as loans.
3. 74 percent of loans were made at low rate of interest.
4. All data are as of 9/29/83.

Mr. Belloni. We received very few applications. In Arizona, out of 849 people we interviewed, we only got 177 applications back. In California, out of the 343 interviews, we received only 60 applications back.

The deadline for acceptance of applications is really already passed. However, in view of the nature of this disaster, the fact that the floodwaters are still present, the fact that in some instances people aren't able to get back into their property, and the fact that there is a lot of economic injury potential here, our deadline for filing applications for economic injury disaster loans is April 2, 1984. This should allow sufficient time for businesses to estimate their economic injury and file applications.

With respect to the Coalinga earthquake——

Mr. Reid. Rather than all of these statistics, I wonder if we could kind of submit those to the record and get into some questioning because we are running out of time.

Mr. Belloni. Yes.

With respect to the Coalinga earthquake, it was a very similar situation.

Mr. Reid. OK, thank you.

[The prepared statement of Mr. Belloni follows:]

Testimony by Robert L. Belloni, Area Director, Disaster Area 4,
U.S. Small Business Administration

Before

The House Subcommittee on Investigations and oversight
of the Committee on Science and Technology

Good morning Mr. Chairman and members of the committee.

I am Robert L. Belloni, Area Director, Diaster Area 4, U.S. Small Business Administration. Mr. Kulik, Deputy Associate Administrator for Disaster Assistance is unable to be here this morning, and has requested that I testify on behalf of the agency.

I have with me this morning, Mr. Richard J. Moser, Area Counsel, Disaster Area 4, who will assist me in providing testimony.

Disaster Area 4 covers the Western 14 States, and accordingly, the Colorado river flood falls within my area of responsibility. I have prepared a very short statement for the record, and with your permission will read same into the record.

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The Small Business Administration's role in any disaster situation is to provide assistance to the disaster victims through our disaster loan programs. The agency's principal role in mitigating against the effects of future disasters is to:

1. Participate with FEMA and other agencies in a post-disaster hazard mitigation study.
2. Possibly fund the relocation of disaster victims (homes, business, etc.) on either a voluntary or involuntary basis.
3. Require strict compliance with the Flood Disaster Protection Act of 1973, as a condition of SBA's loan - - when the damaged property is in an identified flood hazard area.

As previously stated, with respect to providing assistance to disaster victims, our role is to make disaster loans available to all eligible victims of the disaster.

In this instance, Colorado River flooding, the disaster was declared by the President. FEMA, acting as the coordinating agency, set up a series of Disaster Assistance Centers, in both Arizona and California, for purposes of matching the disaster victims up with any and all possible federal aid. for which they may qualify.

SBA staffed each of the centers and issued program information and loan applications to all interested parties. In some few instances immediate decisions were made with respect to lack of repayment ability, and those individuals were immediately referred to the State/Federal Grant Program for possible assistance through that means

SBA Disaster loans are limited to $50,000 for homes and $10,000 for personal property - - for a $55,000 total. For businesses we are able to loan up to $500,000

The prevailing interest rates for this particular disaster are:

HOMEOWNERS WITH CREDIT AVAILABLE ELSEWHERE	11.250%
HOMEOWNERS WITHOUT CREDIT AVAILABLE ELSEWHERE	5.625%
BUSINESSES WITH CREDIT AVAILABLE ELSEWHERE	10.500%
BUSINESSES WHITHOUT CREDIT AVAILABLE ELSEWHERE	8.000%
BUSINESSES (EIDL) WITHOUT CREDIT AVAILABLE ELSEWHERE	8.000%
OTHER (NON-PROFIT ORGANIZATIONS INCLUDING CHARITABLE AND RELIGIOUS ORGANIZATIONS)	11.375%

The loans are available for purposes of restoring damaged property, as near as possible, to pre-disaster condition. For businesses, additional funds may be available, through the the Agency's Economic Injury loan program for, working capital - - to assist the businesses in maintaining viability. In certain circumstances, it is possible for the Agency to refinance existing mortgages, on either homes or businesses.

A summary of our loan making activity as of October 6, 1983 is attached.

This concludes my statement this morning. Mr. Moser and I will be pleased to answer any questions that the committee may have.

COLORADO RIVER FLOOD

Declaration No: 209706 (Phys) Declaration Date: 7/1/83 Deadline Date: 9/2/83
607800 (EIDL) 7/1/83 4/2/84

State: California Counties: Imperial, Riverside & San Bernardino

Significant Actions	Total		Home		Business		EIDL	
	#	$ (000)	#	$ (000)	#	$ (000)	#	$ (000)
Interviews Conducted	343	N/A	218	N/A	54	N/A	71	N/A
Referrals To IFG	57	N/A	57	N/A	N/A	N/A	N/A	N/A
Applications Accepted	60	6,442	24	254	21	3,526	15	2,662
Applications Processed	37	N/A	18	N/A	9	N/A	10	N/A
Loans Approved	15	894	4	36	6	618	5	240
Loans Disbursed (*)	--	--	--	--	--	--	1	25

(*) Includes 1 loans which have had initial disbursement only.

Notes:
1. 62 percent of applications accepted have been processed.
2. 41 percent of applications processed have been approved as loans.
3. 87 percent of loans were made at low rate of interest.
4. All data are as of 10/6/83.

COLORADO RIVER FLOOD

Declaration No: 209806 (Phys) Declaration Date: 7/1/83 Deadline Date: 9/2/83
607900 (EIDL) 7/1/83 4/2/84

State: Arizona Counties: Lapaz, Mohave & Yuma

Significant Actions	Total		Home		Business		EIDL	
	#	$ (000)	#	$ (000)	#	$ (000)	#	$ (000)
Interviews Conducted	849	N/A	354	N/A	168	N/A	327	N/A
Referrals To IFG	63	N/A	63	N/A	N/A	N/A	N/A	N/A
Applications Accepted	177	11,146	95	2,395	44	4,120	38	4,717
Applications Processed	115	N/A	62	N/A	23	N/A	30	N/A
Loans Approved	37	320	24	337	5	150	8	131
Loans Disbursed (*)	4	13	2	9	1	5	1	4

(*) Includes 2 loans which have had initial disbursement only.

Notes:
1. 65 percent of applications accepted have been processed.
2. 32 percent of applications processed have been approved as loans.
3. 68 percent of loans were made at low rate of interest.
4. All data are as of 10/6/83.

Mr. REID. You indicated that the limit for himes, SBA, is $55,000?

Mr. BELLONI. Correct.

Mr. REID. Now, don't you have authority to raise that, is that just an administrative limit?

Mr. BELLONI. I believe so, sir.

Mr. REID. I am quite sure that the legislative limit is like $500,000, something like that. In fact, hasn't the Small Business Committee along with Jack Brooks and some other Members of Congress directed a communication to the Small Business Administration recommending that these limits, present limits of $55,000 for homes and $10,000 for personal property be doubled; are you familiar with that?

Mr. BELLONI. Yes; I am, sir.

Mr. REID. And is that now under consideration?

Mr. BELLONI. That is under consideration; however, I believe that OMB approval is necessary for that.

Mr. REID. Can't hear you.

Mr. BELLONI. I said OMB approval is also necessary for such action to take place.

Mr. REID. And it is my understanding that the Secretary of Agriculture, for disaster cause, has lowered those loan rates to 5 percent. Do you have that authority also?

Mr. BELLONI. Yes, sir, and that is presently being considered.

Mr. REID. Now, the question I have of both of you, and, Mr. Winkle, since you haven't talked for a while, would you respond to this:

We heard in Yuma and in Needles, and we have heard here today, that FEMA hasn't responded well. You have been there right as soon as there has been a disaster, but after that, for whatever reason, at least in the eyes of the people that have testified, things started breaking down and they did not get the help to which they thought they were entitled.

I would like you to respond to that, but in doing so, I would also like you to respond to the question I asked the man—what is the man who testified down in Arizona, in California—what was his name from FEMA? Vickers?

Mr. WINKLE. Bob Vickers, yes.

Mr. REID. I asked him a question and I thought his answer to be incredible, frankly. I said, are you short handed, do you have enough personnel? He said, yes, we have enough personnel.

Statistically, I am told that much of the help you use is temporary help. I am also told that that help which you have that is static has an overwhelming amount of paperwork. Now, has there been a consideration given to the response that Dr. Vickers gave? Do you really have enough help to process all these claims and do the things that you are required to do?

That is the first question.

Mr. WINKLE. Sir, I would have to say that we cannot predict the number of disasters we are going to have, but for the average historical workload, I would have to say it stretches it, but we do, I think, have enough, we do have the—a reservist program.

These are temporary people. From the standpoint of economics, it makes good sense to have this.

Mr. REID. Please, go ahead.

Mr. WINKLE. From the standpoint of economics it was an authority that Congress did give us under the Disaster Relief Act to establish a disaster revisionist-type program which means that the people are only paid when we actually have to have them respond to a disaster.

Certainly, it is a problem of being able to get commitments from the individual as to their capability and on a quick turnaround, also keeping them up to date, keeping them trained, things of this nature.

Obviously, it would be more desirable from a managerial standpoint to be able to have permanent people that he can have available to him at all times, but then the effective utilization of them, without the ability to predict Mother Nature, does not make that practical.

Mr. REID. You know, I am happy to hear that for the second time, because traditionally, what we hear from Government agencies: We are understaffed, we can't do it.

And so, even though I thought Dr. Vickers' testimony was incredible, you have also said it is not a problem having too little personnel.

I am very happy to hear that.

The last question that I asked, I will just repeat it. Why do you think these people are complaining like they do, not only the people from Coalinga—I am sure you heard the testimony from the people in Yuma and Needles—just saying FEMA wasn't there when we needed them. Why?

Mr. WINKLE. Sir, I think very honestly that—and this is something we try to protect against—but in the efforts of our people in honestly wanting to help, that they give the impression and maybe create overexpectations.

Clearly, there are limitations of what we can do, as I am sure you are well aware what our legislative authorities are.

The mere fact that an individual can get a loan, even though it may be at a reduced interest rate, that is still a loan and it still requires paying back, and obviously there is no substitute for private insurance.

But I think it is a simple matter that in spite of our efforts, there is created overexpectations, that we will make people whole again, put them back exactly as they were as if there had never been a disaster that occurred.

We clearly don't have that authority. It is limited. It is very specific what we can do.

Mr. REID. Congressman McCandless?

Mr. MCCANDLESS. Thank you, Mr. Chairman.

In our Coalinga testimony, we talked about a reoccurrence of a magnitude of it, if it were to happen in the first time rather than the second, third, or fourth that it would qualify and would be something that FEMA and the other agencies would respond to, but that the 100-day period, as you heard from the testimony, was a cutoff point.

Does FEMA, in these kinds of reoccurrences—whether it is Coalinga or the Colorado River or some other location where there is clearly multiple rather than another kind of situation—do you have the authority as administrator to consider those as separate incidents?

Mr. WINKLE. Yes, sir, we do. And it troubled me hearing this for the first time, sitting here in the audience during the mayor's testimony. That is the first time it has come to my attention.

I do intend to investigate it. I do think that we have some administrative flexibility that will address this, inasmuch as it would be aftershocks to a prior disaster.

And clearly, we have the authority under our programs and I do not want to speak for the gentlemen from SBA, but I think he has some authorities that administratively can provide some extension to the established deadlines for making applications.

Mr. MCCANDLESS. Do I understand when FEMA acts separately, not in conjunction with another agency, that the availability of resources is primarily to those in the public sector for the rebuilding of roads, of other capital improvements and that FEMA per se does not have any authority in the private sector, other than possibly relocation for housing purposes or disaster relief for those types of expenditures. Am I correct in my assumption?

Mr. WINKLE. Yes, sir. If I may clarify it, I will try to do it very quickly. We do have some authorities—FEMA does have some authorities, those that are spelled——

Mr. REID. Can't hear you.

Mr. WINKLE. Those that are spelled out under the Disaster Relief Act basically are to provide temporary housing for individuals. It is to provide the funding for a grant program to individuals.

But the law says it must be administered by the State, so we provide the guidelines. We provide 75 percent of the funding, and then there is provision for disaster unemployment assistance and some legal services.

But beyond that, it does principally come from other Federal agencies.

Mr. MCCANDLESS. Let me take your comments and put them in perspective of an example. A home in Coalinga that was destroyed by the earthquake, there is nothing favorable to FEMA per se that will addressed the problem that homeowners have with respect to the construction or repair of the homes; is that correct?

Mr. BELLONI. Unless they cannot qualify for the disaster loan program of SBA's and can possibly qualify for the individual grant, but that is only $5,000 and obviously would not go very far.

Mr. MCCANDLESS. $5,000?

Mr. BELLONI. That is the maximum amount.

Mr. MCCANDLESS. Concerning the testimony expressed by Dr. Cottrell from the county considering the diseases that were outlined, were you in the audience?

Mr. WINKLE. Which one?

Mr. MCCANDLESS. Dr. Lee Contrell, chief health officer.

Mr. WINKLE. Yes; I was in the audience.

Mr. MCCANDLESS. I found it very interesting from their point of view of their application for assistance, the response from FEMA. Do you have any comments about that kind of thing? What we are talking about under the California code, the direct responsibility for health, safety, and welfare of the people of Imperial and Clifford Counties, the chief health officer trying to accomplish something that he feels is a major population [inaudible].

Mr. **Winkle**. Yes, sir, I guess I share a lot of frustrations. I think it is something that we may be able to address without any change in administration. At the present time, for any kind of activity, that is the responsibility of either the State or the local government or a combination of the two, following the area of public assistance.

This would include the matter of spraying for mosquitos. As such, it requires the exercise to satisfy congressional requirements that go beyond State or local government.

I think we can pursue, look, and see if we can disassociate these emergency-type activities from the assistance program, then maybe we could alleviate that type of problem.

Mr. **McCandless**. Mr. Vickers in Needles responded in a way I want to share with you. He said, well, we don't think the Governor has [inaudible] that is, to which I said, certainly you will proceed in an expeditious manner to make that possible.

It would appear to me that the review of the process would be such that when a Governor or an agency that is required to perform its function does so that the declaration would be all encompassing in that it would address administrative requirements, all aspects of the legislature, health department, whether it be public health facility, whether it be a private sector location. Is there some problem there I am not seeing?

Mr. **Winkle**. Yes, sir, I think so.

The reason that has been separated and split out is to be able to address [inaudible] of individuals without having to exercise and satisfy the statute requirements for the commitments of foreign, State, and local governments.

Mr. **McCandless**. Yes: I understand what you said and I know that you have your parameters in which you have to function in order to operate. The health, welfare, and safety of a county or State, in my opinion, particularly people we are talking about, diseases are spreading is of a consequence.

It appears to me there should be a more expeditious manner from Dr. Cottrell and his frustrations as the person under California law directly responsible for health, welfare and safety, that had he been [inaudible].

Mr. **Winkle**. I would appreciate that.

Mr. **McCandless**. Thank you.

Mr. **Reid**. Congressman Dymally?

Mr. **Dymally**. Is it accurate to say that we are not prepared in any agency of the Federal Government to deal with major disasters such as we experienced in Coalinga or we experienced on the Colorado?

Mr. **Winkle**. I am sorry, I did not understand your question.

Mr. **Dymally**. Is it accurate to assume that we are not prepared in any Federal agency to deal with a major disaster?

Mr. **Winkle**. Acoustics are bad.

In answer to your question, I do feel the Federal Government is capable of dealing with a major disaster.

Mr. **Dymally**. Let's go on the assumption that your response is accurate. Then what accounts for the voluminous amounts of complaints that we get, such as we had here today, and as we have in other areas of flood disaster, earthquake disaster, to name just a few?

There is obviously something wrong that so many people find cause to complain. When I say not capable of dealing, not in terms of financial assistance, but I mean in terms of the flexibility of the law, the availability of adequate resources, the responsiveness of agencies to the immediate problems not covered by the statutes.

Mr. WINKLE. Sir, I think what I have heard here today—I was not present at the Needles and other hearings; however, I have read the transcript. I think it is a matter of interest rates on the loan. I think partially due to the fact it is a loan, you have to pay it back.

Mr. DYMALLY. All right, let's take Mr. Kemper as an example. Through no fault of his own, he has lost everything he and his family have built up in the last decade or more. He was completely wiped out, as the young folks would say.

He is paying a mortgage on which there is no property, there is no building. There is property, no building. The prospects for the future look very grim. That seems to me an inability of the system to respond to that particular disaster and he is not unique. He is typical of the people in Coalinga. Am I representing that correct?

We did not respond to the people who did not come here today because they couldn't afford the fare to come here. So there is obviously something wrong with the system that is not responsive, or we have not been prepared ourselves to deal with these emergencies, FEMA or any agency for that matter.

Look at the flood disaster, people lost their homes in Phoenix, nothing to do with the opening up of the gates, just the rains, and their property is lost, washed away. They probably couldn't help it and we are not in a position to assist them.

Mr. WINKLE. I don't know.

Mr. REID. Gentlemen, will you remain available tomorrow for another hearing?

Mr. WINKLE. I will be.

Mr. REID. Are you going to be in Las Vegas tomorrow? I would surely help things because I think that Congressman Nielson for example would like further questioning. I think the time is running to a close. I think it would be important because so much of this remains to be investigated.

We really don't want——

Mr. WINKLE. I would be available tomorrow.

Mr. REID. We appreciate it.

Mr. BELLONI. From the standpoint of further questioning, do you think that the appearance of the Small Business Administration would be beneficial?

Mr. REID. We don't really have a problem with any questioning, although some may come up during the hearing.

Congressman Nielson?

Mr. NIELSON. I was looking at the flood and the problems there and you did comment very quickly, I want to comment on your earlier response to things that bothered me about it.

First of all, you said that individuals who have loss [inaudible] for example, what about private firms, what about private firms who help in taking care of disasters [inaudible].

Mr. **Winkle**. First of all, the arrangements that were made, if it was an arrangement-type of arrangement that was made with the local government or State government, then the [inaudible].

Mr. **Nielson**. One last question, in reference to the Colorado flood, you say it has to be beyond the ability of county or city before you can do anything about it. You have to determine first Clark County could not handle it [inaudible].

Mr. **Winkle**. Perhaps again I think a great deal is we feel that we would be entirely out of our responsibility of the law if we did not establish that it was beyond the capabilities of the State and local government. That does perhaps take some time.

Mr. **Nielson**. Why does it take 6 weeks? Why does it take as long as it did?

Mr. **Winkle**. I am not familiar with the details of that county, but be glad to check it out.

Mr. **Reid**. Do that in writing and submit it.

Mr. **Winkle**. Perfectly willing, sir.

[The material referred to follows:]

Federal Emergency Management Agency
Washington, D.C. 20472

With Regard to Flooding along the Colorado River

On July 1, 1983, the President made major disaster declarations for the State of Arizona and the State of California due to the flooding of the Colorado River. The Federal Emergency Management Agency (FEMA) designated three counties in California and three counties in Arizona eligible for Individual Assistance. Individual Assistance is that assistance provided to disaster-affected families and individuals. All six counties involved are adjacent to the Colorado River. Joint damage assessments in the public sector could not be completed at this time. The assessment team was able to verify emergency-related costs for sewer repair, temporary pumping, road barricades and extra security personnel. The team also was able to verify the costs expended in vector control while recognizing the fact that the Center for Disease Control (CDC), which was working under assignment for FEMA, had not certified the situation as a health hazard. Due to the level of water, neither FEMA nor State officials could determine the extent, if any, of damage to other public facilities. Many road systems were under water. While roads normally are not designed to be inundated for long periods of time, damage to roads which are inundated varies greatly. If traffic is minimized or prevented, damage to roads could well be minor rather than major. Also, the rise in the ground water caused by the elevation of the river inside the levees was moving slowly landward from the dikes and these damages to public facilities could be determined. However, the future impact on other public facilities in the vicinity could not be determined. A visit by a member of my staff on July 26-27, 1983, indicated that although damages were increasing slowly, a reasonable assessment of future damages could not yet be determined. It should be noted that Federal disaster assistance under Public Law 93-288, the Disaster Relief Act of 1974, is supplemental in nature and provided when the severity and magnitude of the situation is beyond the capabilities of the State and local governments.

On August 15, 1983, CDC certified a health hazard existed and provided guidance to State officials regarding the actions which should be taken to control the mosquito population. Taking all facts into consideration at this time, there was inconclusive information to support the request on the part of both States for Public Assistance. Both Governors were notified of this on August 23 and also informed that FEMA would continue to monitor the situation closely before giving a final decision.

The Governor of Arizona by letter of August 30, 1983, indicated that Federal assistance was needed to assist the State in their vector control work.

A member of my staff with FEMA Regional staff together with State representatives reassessed the damages during the period of September 13-16. It was determined that the vector control costs were increasing and were projected to continue for several months. More public facilities were damaged due to the ground water problem and some additional damages now could be reasonably projected. These facts, taken into consideration with the capabilities of the State and local governments, resulted in a determination that the flooding and related problems were beyond the capabilities of the State and local governments. Thus, Public Assistance was designated for the same six counties designated for Individual Assistance.

The delay in designating public assistance for six weeks resulted from the fact that during our previous evaluations of the damages were not beyond the capabilities of State and local governments. However, once the determinations were made that disaster-related damages were beyond the capabilities of State and local governments, the designations were made in a timely manner.

We have determined that, in the future, requests for assistance involving public health and safety, such as vector control, may be evaluated separately from requests for the full range of public assistance. While assistance for protection of public health will still be supplemental to State and local efforts, we will be able to avoid delays where it can be demonstrated that supplemental Federal help is needed.

The Governor of Nevada did not request a major-disaster declaration as a result of the flooding from the Colorado River. Consequently, Clark County, Nevada, which is located across the Colorado River from Mohave County, Arizona, was never under consideration for eligibility for supplemental Federal disaster assistance in this situation.

Mr. REID. Our time has left us. We have asked all the questions that have to be asked. We appreciate the audience's attendance here. And so that everyone does know, everything is being taken down verbatim by the court reporter, all statements in writing will be submitted to the court reporter and a verbatim transcript will be kept.

I appreciate everything. I appreciate everyone's attendance. Thank you, all of the witnesses, who have gone to the trouble to come.

This meeting stands adjourned.

[Whereupon, the subcommittee recessed, to reconvene at 10 a.m., Friday, October 14, 1983.]

FORECASTING AND TECHNOLOGY FOR WATER MANAGEMENT

FRIDAY, OCTOBER 14, 1983

House of Representatives,
Committee on Science and Technology,
Subcommittee on Investigations and Oversight,
Washington, D.C.

The subcommittee met, pursuant to notice, at 10 a.m., in the Las Vegas Convention Center board room, Las Vegas, Nev., Hon. Harry M. Reid presiding.

Present: Representative Reid.

Mr. Reid. This hearing of the U.S. Congress Science and Technology Committee is called to order.

I would indicate for those that weren't here yesterday that we welcome you here to these hearings regarding the disastrous events of the flooding this summer.

As most of you know, in early September my friend and colleague, Morris Udall of Arizona, conducted hearings focusing on the crises we experienced when the Colorado River flooded in June and July of this year.

These hearings were held in Blythe and Needles. A number of important topics were discussed at those proceedings, but it was my belief that some of the things that we learned there and learned during the days of the flood warranted closer examination. Thus, our purpose here today is to listen to the witnesses we have called, take that information back to our colleagues in Washington, and recommend to them legislative action that the subcommittee believes is necessary.

Yesterday, in Boulder City, the subcommittee focused on the performance of one Federal agency in the wake of the disaster, the Federal Emergency Management Agency, more commonly known as FEMA. Frankly, their report car was not that good.

After hearing from a number of disaster victims, not only people who suffered from the flooding but those who suffered in the Coalinga earthquake in California, it appears there are a number of substantial changes that that agency ought to make to better fulfill its responsibilities.

Today it is our intention to focus on the performance of two other Federal agencies, the Bureau of Reclamation and the National Weather Service.

Our special focus with the Bureau will be to explore whether we need to reexamine and perhaps ultimately change the way in which the Colorado River is managed.

All of us know that the Colorado River is probably one of the most fussed over entities in the world, and different areas have sometimes vastly different uses for it. Thus, designing its proper management certainly isn't an easy task.

Nevertheless, this summer's events have certainly demonstrated that some changes need to be made and so this subcommittee hopes to make some wise suggestions to that effort.

This summer's flooding also made it clear that it is too much to expect the Bureau to operate the river without good weather forecasts. There appears to be a case building that the Weather Service's information isn't necessarily the best available. And so we will discuss today why that is so, and ultimately make some suggestions to improve the quality of the forecasts they supply to the Bureau.

This last point is important, for it emphasizes one of our highest objectives of this inquiry. While it is obviously necessary to find out what went wrong with this year's river problems, it's not useful or productive to cast blame just for the sake of casting blame.

We wish to take a more positive approach, learn from our mistakes, and make positive suggestions to eliminate the chances of reoccurrence of the flooding this summer. This is one of Congress most fundamental obligations to the taxpayers in this country.

Before we get started with the testimony I'd like to express my appreciation to Congressman Mervin Dymally who appeared yesterday in Boulder City as a member of the committee to listen to the testimony.

I'd also like to express my appreciation to Congressman McCandless who appeared yesterday, also a member of this committee.

I would at this time like to express my appreciation to my colleagues, Howard Nielson of Utah, and I explained to everyone present yesterday that we are very fortunate to have Congressman Nielson with us.

Congressman Nielson, prior to being elected to Congress, was a professor, college professor. He has his doctor's degree in statistics and his being here is extremely valuable to this committee.

To my right is Congressman Dick Durbin who was with us yesterday, and I am especially grateful to Congressman Durbin for being here a second day to listen to these hearings. Congressman Durbin's time expires around noon today—just in this hearing, not permanently—and he will have to leave the hearings early. So those of you who see him leave will understand he has to catch a plane back to Illinois.

Also, we had scheduled to be here Congressman Jerry Lewis of California, who has worked very hard and long in these hearings as we held them in Arizona and California. He wanted badly to be here because his district has been very much affected by these floods. However, as he climbed on the plane yesterday he received word that his mother had suffered a very serious illness, and he had to cancel plans which included a major speech in the northern part of the State and Lake Tahoe area this evening.

So I appreciate my colleagues for being here.

Congressman Durbin, you have a statement?

Mr. DURBIN. I would just say that it's an eye-opening experience from someone from the Midwest to visit here and witness the scope and magnitude of some of the problems you face. And I would say, as yesterday, you are well served with Congressman Reid's efforts to make sure those of us from different parts of the country appreciate some of the challenges you're facing.

Another element I found interesting, there are many parallels where we are dealing with flooding on the Illinois River, you're dealing with flooding on the Colorado River, and although the magnitude of the problem and the circumstances that give rise to it are different, we are dealing with the same agencies, many times dealing with some of the same frustrations.

I thought yesterday's hearings were excellent and I commend the work of the Science and Technology staff which I think is extraordinarily good, both on the Democratic and Republican side, as well as Congressman Reid. And I enjoyed the efforts.

Mr. **Nielson**. I appreciate being here also. I'm not a member of the Science and Technology Committee but the Colorado flows through a lot of my district and we had problems in that district as well.

I was particularly interested in hearing from FEMA because we had a lot of floods and damage in Utah to which they are responding, so that was very interesting to me. I hope I can add some new dimension to this common problem we share.

Colorado, Utah, Nevada, and Arizona are all interested in the Colorado River.

Mr. **Reid**. Thank you, Howard.

Today's witnesses will be comparable to yesterday. We are first going to hear from our Nevadan, who is the Commissioner of the Bureau of Reclamation, Bob Broadbent. Then we are going to hear from Barbara Lausche, who is from the Office of Technology Assessment in Washington. Then we are going to go into a number of panels. We are going to have three panels, the first one dealing with hydrological modeling; the second with meteorologists/forecasting hydrologists; and the last one will deal with the U.S. Government responding, namely, the Weather Service and Department of Agriculture.

Commissioner Broadbent.

Commissioner Broadbent will introduce his subject and how he's going to proceed.

STATEMENT OF ROBERT BROADBENT, COMMISSIONER, BUREAU OF RECLAMATION, U.S. DEPARTMENT OF INTERIOR

Mr. **Broadbent**. Congressman Reid and Congressman Durbin and Congressman Nielson, it's my pleasure as Commissioner of the Bureau of Reclamation and as the designated representative for the Department of the Interior to be here today.

Before I start into my formal testimony, we have about a 15-minute videotape of the Colorado River that was shot during the time of the flood, and we think it might be instructive to you as we go through it if we can take an opportunity to look at that.

Mr. **Reid**. Please proceed.

[At this time the videotape was shown.]

Mr. **Broadbent**. Mr. Chairman, if I might, I'd first of all like to thank you for the opportunity to be here.

As you know we have already appeared before the Interior Committee. We at that time presented a long statement for the record, which we could present also to you for the record.

Mr. REID. We would like to make that part of the record.

Mr. BROADBENT. We will provide that for you for the record as well as our testimony today.

I thought if I might, in accordance with my discussions with you over the last couple of months, I'd like to briefly summarize what we think happened, where we are today, and what it looks like for tomorrow.

Mr. REID. One interruption, I'd like you on the statement that you have prepared for today, spend a little time on that information on page 12, those long-term solutions.

Mr. BROADBENT. All right. I intend to do it.

Mr. Chairman and members of the committee, first of all let me indicate to you that the Department of the Interior has a real interest in the Colorado River. As you know, the Bureau of Reclamation is charged by law as essentially the trustee for the Colorado River for the seven basin States.

The water in the Colorado River actually belongs to the seven basin States by court decree and by agreements between the States.

As many of you know, the water in the Colorado River is fully allocated. The average flow in the Colorado River is about 15 million acre-feet per year, and that's average flow. Allocated out of the Colorado River is some 16½ million acre-feet, 15 million acre-feet to the United States, and 1½ million acre-feet to the Republic of Mexico, so the Colorado River itself is overallocated.

That doesn't mean today it's overused because all the water that is allocated to the United States isn't presently being used. There's probably about 2 or 3 million acre-feet a year that is not presently being used by the United States on an average flow. That's what allowed us, of course, to fill the reservoirs. Glen Canyon Dam was just filled in 1980, and at that time it became apparent that all our reservoirs were going to be full for some time.

First of all, let me take a little time as we go through this. I and the people in the Bureau of Reclamation have real empathy for the people who have been damaged by the floods in the Colorado River. Not only the physical damage, but in many cases the higher damage was the loss of income because of the loss of the use of the Colorado River over this summer and the loss of use for recreation purposes.

We share their concern, and we in the Bureau are doing everything we can. I think our testimony today will indicate what we think is the responsibility of the Bureau of Reclamation in trying to answer the recent problems we have had.

I said a little while ago that the Colorado River was overallocated and that the average flow was about 15 million acre-feet. As late as 1977 we had an average flow in the Colorado River of only 5 million acre-feet. This year we had an average flow into the Colorado River, an unregulated flow into the Colorado River of about 24.6 million acre-feet. That is the highest flow on record into the Colorado River system. Most of that flow as we saw it came as a result of those late storms that happened in late April, and May, and then the heavy runoff that was caused by early hot weather and a large storm in the upper basin. The Weather Service might call this an efficient runoff, which means the snow turns to water and gets the heck off and gets into the river. That's about what we had.

We had our people do a probability analysis that might indicate to you what our chances are of something like this happening again. They tell us that there is a probability of over 50 percent that we will have a higher than normal water year next year because usually one high year follows another.

They tell us that there's about a 2-percent chance that we could have a year as high as this year's, and there's a 10-percent chance that in the next 10 years we could have a year as high as this year. So, there's a real concern in the Bureau of Reclamation about the operation of the river system over the short term until it's fully allocated.

I'd like to spend a little time, if I could, and maybe acquaint you people with some of the laws on the Colorado River. The Colorado River is managed by what is called the law of the river. The law of the river is a composite of State compacts, Supreme Court decrees, court rulings, and Federal laws, all of which really relate to the operation of the river.

We are charged by Congress with the responsibility of operating that river for the seven basin States.

The seven basin States through their Governors designate a representative to what is called a Colorado River Basin—I don't know what the official name of it is—but it is the Colorado River Basin States' representatives forum.

In general those representatives from the seven States are their water engineers for those States and have been the designated representatives for many years.

We meet regularly with these official representatives of the Governors of the Colorado River Basin States.

Many years ago when the original law was passed that authorized this, it, mandated the Bureau to develop a long-range operating criteria for the operation of the river. That was adopted in about 1968. It was subsequently reaffirmed in 1975 and then reaffirmed again in 1980. It has to be looked at every 5 years and that gives us the operating parameters within which we are required to operate the river.

In addition to that, the Corps of Engineers under the 1944 Flood Control Act is designated the responsibility for flood control and for flood control releases along the Colorado River.

We have had several flood control regulations on the river. The latest one was developed in 1982. Those flood control regulations were adopted by the corps in cooperation with the Bureau of Reclamation. We participated with them in those flood control regulations.

Those flood control regulations in general provide that the Bureau of Reclamation must have as of January 1, 5.35 million acre-feet of available flood storage available on the reservoirs, and then depending upon the estimates that are given us of runoff from the Weather Service through their forecasting center in Salt Lake City of which we are a participating agency, we are then mandated to make minimum releases for flood control.

Those are minimum releases. This year every month from January on we made higher releases than were mandated by the flood control regulations. It's our estimate that we went into the year with about 1 million acre-feet of extra flood control space, 1.3 million, and released about 1½ million acre-feet more than were required by about April 1, because of the flood control regulations.

We did that because we knew that the Colorado River system was full; we knew that it wasn't fully allocated, and we knew we were going to have to vacate space some time during the year in order to get down to the flood control allocated space that we would have to have for the following year.

That's assuming that the Weather Service forecasts were accurate and that they were about average.

You have already seen what happened to the Weather Service's forecast. They are going to be able to go into it in a lot more detail. I can cover it a little bit but like to cover only one thing; that is, the Bureau of Reclamation is again working with the Weather Service to make sure that we do everything that we can to get the best modeling we can and do the best job we can in estimating flows of the Colorado River as a result of snow melt.

Again, I'd like to tell you—and this was borne out in our testimony yesterday and by the Weather Service at our Colorado River Basin States meeting—even if we had had a perfect forecast from January 1, there still would have been high flows down the river.

Second, even with the Weather Service having a perfect forecast, the most we would have been able to gain in this case, would have been an additional 2 weeks' notice. That 2 weeks' notice wouldn't have in any way evacuated our reservoirs. We could have in essence said that instead of running 38,000 down the river today we might be running 30,000 or something like that. We are going to begin to cut our releases down the river in the next few days.

We had inflows into Lake Powell of about 116,000 cubic feet per second coming in early in the year. We had outflows out of Parker never any higher than a little over 40,000 cubic feet per second. So the reservoirs themselves were able to hold and to reduce the flows down the river.

Had we gone along with the mandated Corps of Engineers flood control plan on releases some time in late June, we would have been releasing some 65,000 or maybe higher down the Colorado River system. But we, in cooperation with the Corps of Engineers—and I'd like to congratulate those people for their support in this time—we tried to keep the releases down so that they were below a certain level as they left Parker Dam.

We were able to do that. We did it by a combination of circumstances. We put up 8-foot flashboards on the Glen Canyon Dam spillway gates. We have the pictures of Glen Canyon Dam, a videotape about 10 minutes long of the damage and some of the technological things we did at Glen Canyon Dam if you'd like to see it.

Mr. Reid. We certainly would like to see it later on through the hearing. We are going to do that when Mr. Dozier testifies.

Mr. Broadbent. We will show you some of the technology aspects of what we did when we looked at the damage of Glen Canyon Dam and how we responded. But an indirect benefit of what we did at Glen Canyon Dam was to enable us to store an additional 1.3 million acre-feet behind those flashboards which meant in essence that we were able to hold it in Glen Canyon and Lake Powell and not release it during the high days when it would have catastrophically affected our ability to hold water in Lake Mead and would have caused the flow to really expand as it went down the Colorado River. That was an engineering marvel. And when people tell you that the Government can't respond quickly, let me tell you what we did.

The decision was made on a Wednesday, June 29, that we were going to put up 8-foot metal flashboards on top of the spillway gates at Glen Canyon Dam, four spillway gates, all of them about 60-feet long apiece I think.

We entered into an emergency contract with a contractor, Guy Atkinson & Co. In a day we sat down and drew plans for the spillway gates, had them fabricated by a metal fabricating firm in Utah, delivered to the test site at Lake Powell, had them installed over the 4th of July and operational the following Thursday, July 7.

Now that was a feat that I don't think anybody in the Federal Government has to apologize for, and by doing that we were able to really reduce the amount of water that would have to flow down to Lake Mead and further down the Colorado River system.

It actually helped us protect our spillways, which was a prime responsibility we had. But the benefits were far greater than just that.

We are prepared to discuss public notification and some of the other technical aspects of what happened. But let me give you a couple of cases of what happened inside and you can read a lot of things and we can put a lot of things in writing. But I think this perspective—you and I have talked about this, Congressman—the perspective of how you react in a situation like this I think is important, especially for you people on the committee.

When we found out we were in trouble, which would have been early June, and the estimates coming to us from the weather forecasting center were all of a sudden expanding, we knew we were in trouble.

We didn't know how far we were in trouble because every week the estimates were changing and every week we had a different scenario for about 4 weeks. The flows were increasing rapidly. We began to have trouble at Glen Canyon Dam on the spillways. We knew we had trouble down the Colorado River. We didn't think we were faced with any troubles at Lake Mead, but our people met together and made decision on practically a daily basis.

One of the criticisms we have heard is that during this time they were hearing different things from our people. One day we'd tell them it was going to be at one level and the next day tell them another level, and word didn't get around.

The problem was that the circumstances were changing so rapidly that by the time you started on a telephone chain to let everybody know you might be a day later, when you got to be a day later, you had to start all over again because the circumstances just changed that rapidly.

The Bureau people in general put in 800 lines to inform people. They put special people down on the river to try and inform them, but nobody could guess what was happening. When we found out we were at 210 percent on June 28, we didn't know if that was the limit. If we'd have gone any higher in runoff, beyond 210 percent, we would have been in serious, serious trouble. And we were in serious trouble in many cases. And the people down in places like Needles and Parker and those areas kept telling us: Well, what chance do you have of having it come up another 2 feet?

I couldn't tell them what chance they had. They were probably high, they might go up, but as luck would have it the estimates we got about the end of June were correct estimates, and that's all the higher we have to go.

In conclusion I'd like to cover a little bit about where we are, because I think as your committee looks at what you have to do, and the recommendations that you will be making to the operators of not only the Colorado River but the Weather Service and those other agencies that are under your purview, it's good to know where we are going right now.

We have just concluded yesterday our second meeting with the basin States. These meetings are mandated under law. Before we can make any changes in river operations, we have to consult with the basin States. Before we come out with an operating plan for next year, we also have to consult with the basin States, and so this was the purpose of our consultation. In general let me say this: We came out with a proposed operating plan for 1984. We'd like to furnish that for the committee also. It is available. I can't understand it because it's mostly all computer modeling, but they tried their best to explain it to me and I think I can understand the explanation. I will to give it to you if I could.

In general we said this, that until the Colorado River is fully allocated and until the central Arizona project begins to take its allocation of water, there is a good reason to operate the Colorado River differently than we have in the past because of our full reservoir system, and because of the problems that we have at Glen Canyon Dam in repairing those spillways and the tight construction schedule that we have to meet; the necessity to keep the level of the lake lower there because we have serious damage at our facilities at Lake Powell and with Park Service concessionaires at Lake Mead and because we want to keep the flows down out of Parker as nearly as possible under 28,000 for the next few years until the water is fully allocated, and then I don't think we will have a problem.

We propose to make some changes in our operations of the system for the next year, and those changes would carry forward to subsequent years. The changes are basically this. We will continue to run as much water out of the Colorado, down the Colorado as we can between now and the 1st of January without causing any more serious flooding. That means that the level will probably be reduced about 5,000 cubic feet per second below current releases which will give us available storage on about January 1 of about 5.7 million acre-feet assuming we don't have any major rainstorms in the basin area. Major rainstorms will give us a little more than the required flood control space. It won't give us as much as last year, so in January, February, and March up until April 1 we will be running fairly high consistent releases down the Colorado River, which will again give us extra space by April 1.

We think that that extra space that we develop by April 1 will give us the needed space to guarantee as near as possible that we won't have flood conditions next year.

Now I need to emphasize again if we have another high water year like this year, we still are going to have high flows down the Colorado River system because we can't physically empty our reservoirs without flooding people. We don't want to flood them now while we are emptying them or flood them later.

We have to repair our facilities. The Park Service has to get in and repair their facilities, and some of the people along the river system who have been flooded out for months would like to be able to get in and look at the damage that they have in their facilities and then maybe be able to go in and make some repairs.

So we are trying to accommodate all of those different scenarios while still maximizing some of the other uses we have of the Colorado River such as power or fisheries.

The Colorado River system is a complex system. It would be very easy to operate the Colorado River system and never, never have a flood. All you do is draw down the reservoirs. It's a simple thing. Take them down far enough so that there isn't any chance that it will overflow. But that isn't what this system was built for.

The Colorado River system was built for one-twelfth of the area of the United States. It is the source of water for—major source of water for municipal areas like Denver, Las Vegas, Phoenix and Tucson and certainly the Los Angeles area. As such it is also a source of water for some of the best agricultural lands in the United States, areas like the Coachella Valley and Imperial Valley, Palo Verde, and many areas up and down the Colorado River system which are so valuable as we try to develop our agriculture.

So the Colorado River system is just too important not to try and maximize all of these uses. As I said, we could take care of it for flood control. It would probably impact our ability to deliver water for other reasons. We are trying to somewhere get in the delicate balancing act of protecting as much as we can for flood control while at the same time protecting those reservoirs so that the State of Utah or State of Colorado or Nevada when they demand the allocation that they have on the river are going to be able to draw that allocation in dry years.

There is always plenty of water in wet years, and one purpose of the reservoir system is to protect you in dry years. And we don't know when they are going to happen. It may not happen for 15 or 20 years but history seems to repeat itself, and there have been dry years on the Colorado River system which would indicate if we don't hold those reservoir systems at a certain level, there isn't going to be enough water to meet the allocated responsibility we have as trustees for the seven basin States.

Now, in conclusion let me say this: We support a full review of the operations of the Colorado River by anybody. By anybody. We don't care who it is. We will support them, cooperate with them. If they can find a better way to control the flows, we are for it. We think we have the most sophisticated computer modeling system on the Colorado River. And if they want to run what we think will happen as a result of that sophisticated computer modeling, we'll be glad to do it for them. We have cooperated with them and we will continue to.

We think that we ought to look at all aspects of the value of the river: conservation, storage and supply, flood control, power, water quality, recreation, fish and wildlife, flood plain management and development along the river, and environmental quality and general economic development. All of those are so important to the basin States.

The Southwest cannot continue to grow without full allocation of the Colorado River. It cannot. It's the major source of water for the Southwest. The Bureau of Reclamation in conjunction with seven basin States has formed this working group, and we will be seeking input from all interested parties on the operation of the river.

These are short-term solutions I have just talked about. How we intend to recommend to the basin States and individuals that we operate the river next year will effect the short term.

We also feel that there are some long-term solutions that need to be looked at, such as improvements in the weather and stream flow forecasting, which you're going to spend a lot of time on.

We will be happy to cooperate in any way we can with your committee and the Weather Service to make sure they have everything they need to do the best job that is physically capable of being done.

Modifications to reservoir operations, we are willing to look at any modification of our reservoir operations that protects all the uses of the river. We think that one of the other solutions may be construction of new storage facilities, and certainly all of us ought to be willing to look at the construction of a new storage facility along the Colorado River system.

We also think the States have a responsibility in flood plain management and certainly FEMA has said the same thing. The Colorado River system was built so that it should be able to carry 40,000 cubic feet per second, or 50,000 cubic feet per second below Parker, and that reservoir there was then built so those dikes would carry considerably more than that.

Well, we have not been able to do it, and we all know why. I have the Park Service Superintendent Jerry Wagers from the Park Service here in Boulder City and also Dean Bibles who is with the Bureau of Land Management, State director of Bureau of Land Management in Arizona, and also many Reclamation people.

Mr. Chairman, we'd be happy to discuss any items that you have on the operation of the river. We'd be happy to answer any questions you have. If we can't answer them right today, we will be glad to provide them for the record.

Thank you again for the opportunity to appear. We think the Colorado River system is a unique system. We feel a strong responsibility as trustees for the seven basin States to do the best job we can. We look forward to working with your committee, with Congressman Udall's committee, and with the basin States to develop the best plan we can for the beneficial use of their great system that we have, the Colorado River.

Thank you.

[The prepared statement of Mr. Broadbent follows:]

STATEMENT OF
ROBERT N. BROADBENT
COMMISSIONER, BUREAU OF RECLAMATION
DEPARTMENT OF THE INTERIOR
BEFORE THE HOUSE COMMITTEE ON SCIENCE AND TECHNOLOGY
OCTOBER 14, 1983, LAS VEGAS, NEVADA

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Mr. Chairman and members of the Committee, I appreciate the opportunity to discuss with you the operation of the Colorado River. I am testifying today for the Department of the Interior. I have with me Mr. Dean Bibles of the Bureau of Land Management and Mr. Jerry Wagers from the National Park Service to answer any specific questions you may have.

The Colorado River system is complex in terms of the often conflicting demands placed upon the river, and in terms of the Federal/State institutions governing management of the system. I will cover some of the significant factors that must be considered in determining the most appropriate operation of the system.

The undepleted (or virgin) flow of the river varies widely during the year, from year to year, and over periods of several years. The runoff this year will be about 24.7 million acre-feet (MAF) and is the highest on record. By comparison, the 1977 water year, the lowest on record, was only 5.0 MAF. The long-term average virgin flow of the river is approximately 15 million acre-feet per year. Based on the 1906 - 1978 historical record, the probability of flows exceeding 24.7 MAF at Lee's Ferry is approximately 0.8 percent (120-year flood).

In order to minimize the effect of extreme fluctuations in the Colorado flow, Congress authorized an immense network of storage reservoirs. Anchored by Lake Mead in the Lower Basin and Lake Powell in the Upper Basin, the nine major storage reservoirs in the Colorado River Basin have a maximum storage capacity of 61.5 MAF. After deducting the required flood control space, these reservoirs make available approximately 56.1 MAF of usable storage on January 1 of each year. The minimum required flood control storage space (5.35 MAF) is approximately the same as the amount of virgin water supply in a drought year such as 1977.

The Bureau of Reclamation operates the Colorado River reservoir system in accordance with the Coordinated Long-Range Operating Criteria developed in consultation with the Basin States. These criteria emphasize water conservation in order to meet the States' annual water allocations as provided for in the Colorado River Compact and other legal obligations. The Operating Criteria provides flexible policies regarding the operation of the reservoir system. The annual operating plan, developed within the context of the Operating Criteria, provide "detailed rules and quantities" for all purposes for the reservoirs.

Since the initial apportionments of Colorado River water were based on data indicating an average flow in the river considerably greater than what is now considered to be the long-term average, the Colorado River is over-allocated by about 2 MAF of water a year. Currently, however, most of the Basin States have not developed the ability to fully utilize their allocations. Thus, there has been an average annual excess of more than 2 MAF of water since the closure of Glen Canyon in 1963. This extra water was used to fill Lake Powell, and flows below Hoover Dam were limited to downstream requirements and guaranteed deliveries to Mexico from 1963 until 1979. As the Colorado reservoir system filled to near capacity in 1976, the Bureau of Reclamation alerted downstream interests to the likelihood that larger releases would have to be made from Hoover and downstream dams. However, 1976 and 1977 turned out to be very dry years, and system storage decreased. In 1979, the reservoir system again was nearing capacity, and it became necessary to release water in excess of downstream requirements from Lower Basin reservoirs. In 1979, the Secretary of the Interior, after consultation with the Basin States, approved the release of 700,000 acre-feet of water in excess of downstream needs in order to reduce the probability and magnitude of larger, damaging flood control releases. Such extra, or anticipatory flood control releases were also made in 1980.

In accordance with the Corps of Engineers flood control operating criteria, which were revised in 1982, 5.35 MAF of space are required for flood control storage on January 1 of each year. Coming into 1983, available flood control space in the system was 6.6 MAF, which would have been more than adequate in a normal year.

However, 1983 turned out to be a very extraordinary year with the highest runoff on record. Although the reservoirs were effective in reducing the peak inflow of nearly 120,000 cubic feet per second to about 40,000 cubic feet per second along the lower Colorado River, high flows in the river caused property damage along the lower Colorado River in the United States and Mexico. High flows will continue for much of this year as the reservoirs are drawn down. Over the next decade, the river water supply will probably exceed demands, and as a result, with above normal runoff flood control releases are likely. After that period, however, demands will begin to exceed average supplies, and over the long term reservoir levels will decline. The Basin States and the Federal Government must continue to work closely together to ensure that the reservoir system is operated in the best possible manner to avert the near-term flood threat without jeopardizing the long-term water supply and power generation potential of the basin.

I sympathize with those people living and working in the Colorado River Basin who have been affected by this year's flooding, but I would like to emphasize that we did everything we could do to keep damaging flows to a minimum. As previously mentioned, the 1983 water year runoff is the highest on record for the

Colorado River. The April through July spring snowmelt runoff was 210 percent of normal, or approximately 7.5 MAF greater than the normal spring runoff of approximately 7.0 MAF. Throughout the flood control operations, the water releases were consistent with the Coordinated Long-Range Operating Criteria adopted by the Secretary of the Interior in 1970 and the flood control regulations. Every effort was made to schedule water releases at Hoover, Davis, and Parker Dams to minimize flows within the floodway channel.

COLORADO RIVER OPERATIONS DURING 1983

The Secretary is required by Public Law 90-537 to prepare an annual operating plan for the Colorado River. The plan prepared October 1, 1982, projected operations at Lake Powell and Lake Mead in anticipation of a near normal year. (These reservoirs are the key to river regulation in the Colorado River Basin.)

As the runoff forecast increased dramatically in June, it was necessary to change our previous plan and begin planning for flood control operations. The operating plan during the 1983 high inflow period was to maintain flows not to exceed 40,000 cubic feet per second (cfs) on the Lower Colorado downstream from Parker Dam. The planned floodway capacity of the river below Davis and Parker Dams is approximately 40,000 cfs. The levee system is designed for flows of approximately 50,000 to 70,000 cfs below Davis Dam. Further downstream below Parker Dam, the levee design increases from approximately 75,000 cfs at Blythe to more than 100,000 cfs at Yuma. Over the past 20 years, channel degradation and encroachment of development into the floodway have reduced the safe channel capacity to the point where in some areas flood damages now occur at flows of approximately 22,500 cfs. Therefore, while the reservoir releases were maintained at about the planned floodway capacity of 40,000 cfs, considerable flood damage occurred to residential, agricultural, and recreational areas located inside the levee system within the floodway.

The operating plan is revised monthly based on runoff forecasts prepared the first of each month by the Colorado River Forecast Center, located in Salt Lake City, Utah. In 1979, six agencies entered into a Memorandum of Understanding and organized an Interagency committee to work with the River Forecast Center. The agencies involved are the National Weather Service, the Upper and Lower Colorado Regions of the Bureau of Reclamation, the Geological Survey, the Corps of Engineers (COE), the Soil Conservation Service, and the Western Area Power Administration. Since 1979, the runoff forecast has been furnished by the Colorado Basin River Forecast Center of the National Weather Service, with assistance and guidance from the interagency committee.

During May and June of 1983, exceptionally high precipitation occurred under very unusual weather conditions in the Upper Colorado River drainage basin. This caused record-setting storage accumulations behind Hoover Dam and behind Glen Canyon Dam.

Reclamation personnel responsible for the operation of project facilities in the Colorado River Basin had made extra releases from storage during the spring months. On the basis of near normal runoff forecasts through early May, storage space available exceeded that required for anticipated flood control operations. It was not until June 1983 that the Colorado Basin River Forecast Center issued a series of additional forecasts of increasing amounts that by June 28, 1983, amounted to 210 percent of normal inflow (see Table 1).

The reservoir and water operations personnel in the two regional offices (Boulder City and Salt Lake City) evaluated the revised information and quickly determined that spills would occur at both Glen Canyon and Hoover Dam. They alerted other personnel in the Upper and Lower Colorado Regions and in the Engineering and Research Center, Denver, Colorado, that flood conditions were developing in the Lower Colorado River Basin, and that all interested parties affected by the anticipated reservoir releases should be alerted.

Regional Directors Bill Plummer and Cliff Barrett of Boulder City, Nevada, and Salt Lake City, Utah, respectively, and their staff used the news media, public information meetings, and personal contacts at State, county, and city levels to inform the general public of the flooding conditions that appeared certain.

The peak regulated inflow into Lake Powell behind Glen Canyon Dam was approximately 116,000 cfs, and that occurred on June 28, 1983. The first spill commenced on June 2, but the peak storage did not occur there until July 14 , when a maximum elevation of 3708.3 feet (26,374,000 acre-feet) occurred. This elevation was 8.3 feet above the top of the spillway gates. The maximum outflow at Glen Canyon Dam peaked at about 92,000 cfs which was released to flow into Lake Mead behind Hoover Dam about 360 river miles downstream.

Lake Mead storage reached the top of the raised spillway gates (elevation 1221.40 feet) on July 3, the first spill since June 1941, when releases were made to test the dam spillways. The reservoir storage crested at an elevation of 1225.83 feet (26,860,000 acre-feet) on July 25. This was 4.43 feet above the raised spillway gates. The current flood control operating plan seeks to minimize flow levels on the Lower Colorado River downstream from Hoover Dam as much as possible by utilization of the high surcharge levels in the reservoirs.

TABLE 1

COLORADO RIVER 1983 OPERATIONS

DATE	APRIL-JULY LAKE POWELL INFLOW FORECAST (MAF)	PERCENT ABOVE OR BELOW AVERAGE LEVEL	WATER RELEASED FROM LAKE POWELL (AVE CFS)	WATER RELEASED FROM LAKE MEAD (AVE CFS)	AVAILABLE SYSTEM STORAGE
Jan	7.80	112	14,900	19,100	6.6
Feb	7.10	102	15,200	6,600	7.5
Mar	6.70	96	10,400	10,300	7.4
Apr	7.90	114	15,600	17,800	6.8
May	8.13	117	20,000	19,800	6.6
Jun	9.10	131	58,200	31,700	4.4
Jul	14.60	210	57,700	41,900	0.2

DAMAGE TO FACILITIES AT LAKE MEAD NATIONAL RECREATION AREA

At the beginning of 1983, the National Park Service anticipated no problem in providing recreation facilities for an anticipated 6 million visitors. They had been able to operate effectively at lake elevations of 1205 - 1208 feet in the past. The above average elevations in early 1983 did not pose a problem because visitation was low and adequate parking and boat launching facilities were available. The Easter holiday resulted in one of the heaviest visitations on record for the period and even at lake elevations of 1211 - 1212 feet, they were able to accommodate visitors with minimum inconvenience and disruption. In January, it was projected that lake levels would begin to fall before the busy summer season.

In late May, the National Park Service met with Bureau of Reclamation staff to discuss projected lake elevations. The forecast indicated that the lake would not recede, but could rise significantly.

In mid-June, the National Park Service was advised that lake elevations were projected to rise to above 1221 and that measures should be taken to protect permanent improvements.

As the lake elevation increases one foot in vertical elevation, it inundates from 15-30 horizontal feet of parking lot or launching ramp, depending upon the slope or grade. As levels ultimately approached 1225.8 feet (15 feet above the level previously experienced), 225-450 horizontal feet of land were inundated.

Sewerage facilities were the most vulnerable to inundation since they were all close to the 1221 level. It was necessary to construct sandbagged berms, or retaining walls to protect those facitities that could not be moved, and relocate facilities that could not be protected. At the same time, the concessionaires at Lake Mead were also actively engaged in protecting their facilities, such as restaurants and gas tanks. Concessionaires spent $255,000 in attempting to protect facilities and maintain services during this period. They experienced a 10-45 percent loss in business; one concession was almost totally shut down because of high water levels.

Nevada Power Company and the Overton Power District were also active in relocating and raising power lines in areas that had previously been dry, but with high water posed a hazard to sailboat masts. In fact, there were several near misses.

The National Park Service has expended $436,000 in coping with the high lake levels. The major expenditures were for raising protective causeways and breakwaters at Lake Mead Marina and at Echo Bay. It was also necessary to construct new parking lots, surface launch ramps, construct new access roads to facilities, and relocate some facilities above high water.

Recent damage assessments place the estimated repair costs at $2,740,000. The greatest damage is at Overton Beach, where nearly 5 feet of water was standing in the Government owned building, used as a restaurant and store. It was also necessary to evacuate the Overton Beach Trailer Village because it could not be protected. Damage is also expected to occur to National Park Service launch ramps and parking lots, which are just now becoming fully exposed as lake levels drop. Glen Canyon also has damages amounting to $2,866,000 for repairs.

Location of facilities at elevations where they could be damaged by high lake levels was a result of misunderstandings about the operation of Lake Mead. The top of the spillways at Hoover Dam are 1121.4 feet. Avoidance of powerplant bypass and spills had been an objective of operation plans for the Colorado River for many years. In some previous permit activities with the Corps of Engineers, concerning disposal of excavated material, the National Park Service was advised that if the activity occurred above 1221, and therefore did not impact the capacity of the reservoir, a permit would not be required. For whatever reasons, 1221 has always been accepted by the National Park Service as the key elevation, and only temporary facilities, such as graded parking lots and roads were constructed below it. Planning documents over the years have reflected this elevation as did the Lake Mead General Management Plan that is currently being prepared. This plan has, however, been changed to reflect the full flood control storage pool, elevation 1229.

IMPROVEMENTS IN INFLOW FORECASTS

As mentioned earlier, the Bureau of Reclamation is a participant in the Colorado River Forecast Service (CRFS), an interagency committee established to provide support and guidance to the National Weather Service's River Forecast Center in Salt Lake City. We fully support the work of the CRFS subcommittee, formed to evaluate proposed improvements in forecasting for the Colorado River. The objectives of this subcommittee are:

1. to assure maximum use of the existing, realtime data network;
2. to provide justification for additional sites in terms of cost-effectiveness and material improvements in the volumetric forecast and the overall forecasting services provided users; and
3. to provide a schedule and work plan for installation of any additional sites.

We support the goals and efforts of the CRFS and we feel that it has been an excellent forum for communication and cooperation in more effectively utilizing the resources of the participating agencies. We look forward to receiving the recommendations of the subcommittee on enhancing the data collection network and we will make every effort to support realtime (instantaneous transmission by telemetry) data additions which fall within our data and research needs. For instance, we have identified and intend to financially support several stream gaging stations in the data sparse Upper Green River Basin, where realtime data acquisition would benefit both reservoir operation and forecasting.

REVIEW OF COLORADO RIVER OPERATION

The Bureau of Reclamation, together with representatives of the seven Colorado River Basin States, is currently reviewing the operation of the Colorado River system. Two meetings have been held, the most recent yesterday, and we are continuing to evaluate options for the 1984 water year operations plan, as well as studying more long-range river operation strategies.

The Bureau of Reclamation's Steering Committee for the Colorado River Stimulation System (CRSS) has directed initiation of a management alternative study to analyze several long-term issues concerning management of the Colorado River, and a work plan is currently being prepared. Some aspects of the study are directly related to analysis of alternative operating strategies. For instance, two study elements concern operation of Lake Powell and Lake Mead under full conditions. These studies involve making several simulations utilizing different risk levels associated with releases of surplus water. Scheduled work on these study elements has been given increased priority so that the studies will be available for use in our review of Colorado River operations.

The basic options available for minimizing future flooding problems can be divided into short-term and long-term solutions. Short-term solutions are actions that can be taken during the next water year (October 1983 through September 1984). These options are primarily limited to modifications of river operations.

Long-term solutions could include the following types of actions:

- improvements in the weather and streamflow forecasting;
- modifications to reservoir operation decision systems;
- constructing new reservoir storage facilities; and
- floodplain management actions to preserve the original floodway channel capacity of 40,000 cfs.

Above normal runoff is expected for the remainder of 1983. As a result, reservoir releases will need to be maintained at relatively high levels to reach the January 1 flood storage space minimum requirement of 5.35 MAF. To reduce the risk of high reservoir releases during next spring and summer, January through March releases could be maintained at relatively high levels to increase the flood control storage space substantially above 5.35 MAF. Of course, if the spring runoff is below normal then conservation water would be lost Unnecessarily.

In the short-term, extra flood control space may be warranted to allow sufficient time for private property owners and Federal agencies to make repairs or move facilities off of the floodway. The 1984 operating plan could be modified to provide this time (although above-normal runoff next spring could negate any planned low release schedules). Secondarily, the 1984 operating plan has as an objective to have a January 1, 1985, flood control storage space substantially above the 5.35 MAF minimum required.

All the long-term solutions need to be fully examined to evaluate the effectiveness and the economic impacts of each alternative. Extensive intergovernmental coordination would be necessary to fully evaluate the reasonableness of the alternatives considered, especially since local governments are primarily responsible for land use regulations. The Bureau of Reclamation in conjunction with the seven Basin States and other Federal agencies could embark on a program to fully examine each alternative.

Clearly, the value of water lost through the reduced yield of the Colorado River reservoir system implied by some of the long-term solutions must be analyzed as part of the evaluation of the alternatives. And, of course, the requirements of "The Law of the River" must be fully considered in any evaluation of alternative actions.

Mr. Chairman, let me again express my appreciation for the opportunity to appear before this Committee to review the operation of the Colorado River during 1983. I would be happy to answer any questions you may have.

Mr. Reid. Commissioner Broadbent, you indicate as one long-term solution a possible construction of new reservoir facilities. Do you have in mind any place these might be?

Mr. Broadbent. No, we have several facilities that we are looking at. Actually building several small facilities right now.

Mr. Reid. Where is that?

Mr. Broadbent. They're in Colorado. We are looking at the possibility of building some off-treatment sites, pumped storage where we could also get some power benefits off of it. We have several of those sites that we are examining right now. I think it would be important to say the two environmental sites that are always talked about might be the Bridge Canyon and Marble Canyon. They do not provide any reservoir storage to speak of, and we don't—we aren't proposing that we look at those sites.

There is a mandate against our looking at them by the Congress and we don't see at this time that they are a solution to anything.

Mr. Reid. This new operating plan that you talked about yesterday and did also talk about today, would, as you have indicated, increase the flow of the river in months when it normally isn't increased? What timeframe do you have when you feel that the allocation would be fully used so that you would be able to do that? I know it's a rough estimate.

Mr. Broadbent. Certainly the Central Arizona Project will go on line in 1985 and probably will be fully allocated by about 1988 maybe. And that's a guess. They can use a lot of that water at the very front of the system for agricultural purposes, and will probably use all the water they have allocated rather early in the system, even though it won't be municipal-industrial use.

Then it's hard to know. There's about 2 million acre-feet that is presently allocated to the upper basin States that isn't fully developed and used. Of that, water is reserved for energy development, oil, shale, coal slurry, tar sands. A lot of energy development in Colorado, Wyoming and Utah is going to take water resources, and the States themselves are reserving that water for the development of their natural resources.

I can tell you we thought oil shale was going to go rapidly. We have contracts for the sale of water to many corporations in Colorado and Utah for the sale of water for energy development, and that water is just running down the river because the energy has not been developed. So I would guess 30 years.

Mr. Reid. Commissioner Broadbent, there are rumors—and I don't know if they are more than rumors—but statements I assume would be a better way to approach this, that a number of companies, including the Department of Water and Power in Los Angeles, approached the Bureau about January or February of this year wanting to buy more power, indicating they thought there was going to be heavy flows.

Is there any validity to the statements?

Mr. Broadbent. Sure, sure. They are here incidentally and you can call them up to ask them, but I will be glad to speak for them.

Ray, is that all right?

A Voice. That's OK.

Mr. Broadbent. What our studies indicated was not based on the snowpack that we knew was in January, February, and March, but based on the releases that we were going to have to make in October, November and December in order to get the required flood control space by January 1, 1984. It is better for power companies to make those releases in January, February, and March when the water is more valuable for the power interests. It's a lot more valuable commodity in January, February, and March than it is in October because of the cold weather. They use the power allocation out of Hoover Dam and other dams primarily for peaking power and that's when you need peaking power, either in cold weather or hot weather.

So there is validity in that, and we approached that even with the basin States. The basin States told us that the long-range operating criteria says that you will only make releases out of Hoover Dam for two purposes: No. 1, the mandated flood control releases and, No. 2, the consumptive uses that are required for people that are allocated water in the lower basin. That's primarily the farmers down in Imperial, Palo Verde and—And of course the water that is pumped out of Havasu for the Colorado River Aqueduct that goes to Los Angeles. Those are the only two uses for which they want us to release water.

Well, you sit down and look at the law. The law says this——

Mr. **Reid**. Was there any way to—is there any consideration to change that?

Mr. **Broadbent**. That's what we are doing right now. That's what we are talking about next year.

Mr. **Reid**. Last question. I'm sure you have heard this more than I have, people continually come to me, call me and say: Gee, we knew there was going to be more water. I have a boat on the lake all the time and I could tell the water was up. I go snowmobiling and I knew there was more snow. You have heard the same statements. How do you respond to those? How does the Bureau respond to those type of statements?

Mr. **Broadbent**. Those are tough to respond to. Let me take it from the very beginning.

First of all you know we have a lot of reservoirs all over the west and we pretty well knew what our reservoir situation was all over. For instance, we knew in the Sierras, in January, February and March, that the snowpack up there would indicate that we were going to have 200 or 300 percent of runoff because there was lots of snow in the Sierras. We knew over the Wasatch Mountains early in the year that there were problems because there was lots of snow in the Wasatch Mountains above Salt Lake. But the snowpack in the area that is the runoff area for the Colorado River wasn't there. It wasn't there and people could say: Well, look at what it was like over in Donner Pass above Reno, and that's true, water was there. We were emptying all of our reservoirs in January and February on the Sierras trying to get them, down to where we could take care of them but we didn't see it in the Colorado Basin.

We are required under the long-range operating criteria to use as an estimate for inflow into Lake Powell, which is the basis for our estimate on our releases for the Colorado River system, those figures that are given us by the Colorado Basin weather forecasting center in Salt Lake City. That's part of the long-range operating criteria and part of the flood control regulations. Flood control regulations say you base your releases on the estimates you get from this forecasting center.

Mr. REID. Go into more detail with the Weather Bureau on this, but this is the same thing that has been talked about before, that they need better snow measuring and maybe have to do it longer in the year. But that's not your problem.

Mr. BROADBENT. Sure, we agree with that. But even if we had, it would not be able to solve the whole problem.

Mr. REID. Congressman Nielson?

Mr. NIELSON. Mr. Broadbent, you mentioned that Glen Canyon was full in 1980 after many years. You finally got it full in 1980. Why didn't you drop the level of water between 1980, 1983? Why did you leave it full so this problem was there at the start of this year?

Mr. BROADBENT. Congressman Nielson——

Mr. NIELSON. Was that recreational interests in Utah or Arizona?

Mr. BROADBENT. No; it was based on the long-range operating criteria adopted by the basin States. If you go to meetings with the basin States' representatives and say you're going to take Lake Powell down, they say that you're taking the water away from the upper basin. People like Dan Lawrence or Steve Reynolds or Paul Bellhymer, any of those people from the upper basin, they get pretty noisy about it. I would guess that we felt that we were obligated to operate the river according to the law, and it took an event like this to indicate to us that maybe we could take Lake Powell down, but we are not sure that the basin States are going to accept our recommendations.

Our recommendation is a drastic change in the operation of the river, and we are not sure they are going to accept it.

Mr. NIELSON. Follow up on that. Since you are not using over a million feet, they allocated because energy was not developing as fast as you thought it would, couldn't you have taken it down?

Mr. BROADBENT. Sure, but Colorado River system—well, I guess——

Mr. NIELSON. You stated earlier that about a million acre-feet was allocated for energy development in Utah and Colorado which obviously was not taking place. Could you not use that to justify a base amount?

Mr. BROADBENT. Sure, you could. But if you had a dry year, you'd use it and not be able to fill your reservoirs back up.

Mr. NIELSON. Why were you only having about six as early as February of this year?

Mr. BROADBENT. That's what the operating criteria and flood control regulations told us should have gone down the river.

Mr. NIELSON. You indicated you're going to have new storage or additional storage by January 1. Do you know if the other States will accept this plan and, if so, will it be permanent?

Mr. BROADBENT. No; to be permanent there has to be a change in the long-range operating criteria. I think the basin States said that at the Interior meetings. I think you should get their testimony. I think maybe you could ask them to submit some testimony for the record on what we have said, but it would be my opinion that the basin States, most of them would oppose a major change in the long-range operating criteria.

It's my hope that over the next 5-, 6-, or 7-year period they will accept an interim change in the operating criteria, which will give us about as much flood control space as we think we can legitimately ask for.

Mr. NIELSON. Let me ask a question which applies to my area in Utah but may have some relevance here also. That is the central water project. When that gets completed and starts taking water out of the area, will that help solve the problem downstream?

Mr. BROADBENT. Sure, that's one of the major uses of the Colorado River.

Mr. NIELSON. Second, on that one there's a shortage of water up there. My people in the Wasatch and Duchesne are complaining you're taking every bit of water on the horizon and taking all water you can see and they think there's not enough water.

If you have got excess water in Glen Canyon why don't you leave it upstream more in central Utah projects?

Mr. BROADBENT. My only answer would be to you, you have got to amend the laws. All we are doing is following the laws.

Mr. NIELSON. Show us how because——

Mr. BROADBENT. I will show you how. You have got a terrible battle if you try to undo the central Arizona project.

Mr. NIELSON. Not trying to undo, just make sure we have enough water up there where it's needed—not so much in areas where it's a problem in Nevada, Arizona.

Mr. BROADBENT. Most of the areas in Duchesne and like that——

Mr. NIELSON. You have an image problem up there, are you aware of that?

Mr. BROADBENT. We have got an image problem in lots of places. Water is a fighting matter. Lots of people are killed every year over water. I don't want to be one of them. When you start talking about water rights in the West, you're talking about a very, very touchy subject and we own those water rights, incidentally. We own them for the States. Those water rights that are for central water or for any of that are acquired water rights that are owned.

We don't appropriate any water rights and we don't go through the State regulatory process for any of our Colorado River projects.

Mr. NIELSON. You mentioned you had 16½ million acre-feet allocated and only have an average of 15 million acre-feet. What should we do to change that so as to end up with the right amount? In other words, I don't think it's a good idea to allocate more than there is on the average.

Mr. BROADBENT. One of the laws that was passed by Congress said that the Bureau of Reclamation should look at the method of augmenting the Colorado River. Then they specifically said that you can't look at any major interbasin transfers to augment it like the Columbia. We can't look at taking water from the Columbia River. But one method that has probably the highest chance for success is what is called the Colorado River Enhancement Snowpack. Our research in it indicates that it might develop as much as 2½ million acre-feet of water into the Colorado River system every year.

We are ready to go into a demonstration program for that project and are actively working with the States on the method of financing it. If the demonstration program proves successful, about a 6-year program or 8-year program, if it's proved successful, we will be able to go into a full project to augment the flows of the Colorado River by this method. I think it holds some real possibilities.

Mr. NIELSON. In the meantime shouldn't we change the 16.5 back to 15 so we don't raise expectations in Arizona, California and elsewhere that we can't realize?

Mr. BROADBENT. If you want to open up the Supreme Court decrees and the 1922 act and the Colorado River Basin Storage Act and the list goes on and on, you could do that, yes. But I think your chances are probably slim to none.

Mr. NIELSON. The problem ought to be solved. California has been needing more water all along.

Mr. BROADBENT. You say who's going to give up that water?

Nr. NIELSON. Reapportion it one way of doing it.

Mr. BROADBENT. Tough. Like I say——

Mr. NIELSON. I know California has 43 representatives.

Mr. BROADBENT. Chances are probably slim to none.

Mr. REID. Commissioner, if the basin States don't accept your proposal for lack of a better word, the new operating plan, then we have some problems. Do you see anything that could be done legislatively?

Mr. BROADBENT. Oh, sure.

Mr. REID. I'm sure you will keep this committee and the Interior committee notified as to what the program is. When do you expect to hear from the basin States?

Mr. BROADBENT. Our timetable is now, and if it's appropriate we will inform your committee of any action we take. We will give you the documentation of any action we take over the next whatever period you tell us and we will invite your committee to the meetings.

Mr. REID. I think first of the year—

Mr. BROADBENT. We would hope that we would be back with the basin States about the middle of November. At that meeting we will also ask for input from any other interested parties in the operation of the river.

I'm sure that the Los Angeles Department of Water and Power have those concerns that they have expressed and we have talked about earlier, I'm sure that the people on the Colorado River system in Needles and Parker and those areas are going to want to comment on our proposed plan, and we intend to have an opportunity for everybody. I'm sure the basin States themselves will. I'm sure we will hear from the power interests in the upper Colorado River Basin and all of those other interests, at the meeting we plan to have about the 15th of November. That would be for discussion on our proposed operating plan for next year.

Then on about the 8th of December the Colorado River water users have their convention here in Las Vegas. We would think at that time we would call another big meeting of the basin States for the adoption of the plan based on the input that we get from the hearings in November.

Mr. REID. We, of course, would like these plans to be adopted. Administratively it would sure make things easier and quicker. But if that fails, then we are going to have to see if we can get enough forces to do it otherwise.

Mr. BROADBENT. I understand, Congressman. Please tell the seven basin States, will you?

Mr. REID. Just a couple more questions, and we have taken probably more time with you than we should, these are very important questions that I feel we haven't had answered.

Could you give us an update on the progress of repairing the spillways on the dam system?

Mr. BROADBENT. Well, I talked about going in in July to put up the flashboards. At the same time we took the same contractor and told him he had the responsibility of repairing the spillways. They presently have—Wayne, why don't you come up and do that?

Mr. Chairman, this is Wayne Cook, who is in charge of the repairs of the spillways from Salt Lake City and he gave the same report to the basin States.

Take a couple minutes.

Mr. COOK. Basically the major holes that were carved at the elbow section have now been backfilled with concrete. They are demolishing the ceiling areas over those areas in the horizontal tunnel presently at this time. We expect then the next stage would be to zero in and replace the floor in the horizontal sections concurrently with that. The air slot will be taken out over a period from about November through March on the left side and a little bit later than that on the right side.

Then we have to go in and replace the tunnel lining on both sides in the horizontal section. That will take place between mid-November or mid-December I mean and through about February, March period of time also.

The air slot would be completed during that same time frame, then we go in and repair the damage right in the elbow section itself.

Overall program, very optimistic program would have the left spillway repairs completed about the middle to the third week of May and the right spillway completed by the latter part of June or mid-July.

Mr. REID. These are big construction projects, aren't they?

Mr. COOK. Yes, they are. I think if you look at that videotape the Commissioner talked about, it will give you a perspective of the size of the damage.

Mr. REID. One last question, Commissioner Broadbent. I listened closely and read the testimony of George Charchalis and listened to the testimony of FEMA people. What role can the Bureau play to insure we don't continue to let people build in the flood plain, if any, if the Bureau has any control?

Mr. BROADBENT. I've been talking about this with the States and some of the local governments. Just yesterday we had the opportunity to talk with some of the planning people and some of the people from Clark County. They indicate that they would be willing to work with us on a model ordinance which would protect the floodway through from the Colorado River at least for that area that's in Nevada. We would like to work with them on that model ordinance and then maybe provide that model ordinance to other areas up and down the river. It's a local zoning land use problem and the State can get involved and can do it, but we are willing to work with anybody in solving the problem.

Mr. REID. Commissioner Broadbent, thank you very much.

We are now going to call a panel on hydrological modeling which will fit in quite well with the testimony that's just been given. So therefore I call on Dr. Larry Paulson, University of Nevada, Las Vegas, and Professor L. Douglas James, Utah State University, and Larry Dozier, Bureau of Reclamation.

Gentlemen, would you come forward, please?

We have a long statement from you, Dr. Paulson, which we have read and I would like you to summarize this for us, please.

Professor James, welcome to Nevada. We are happy to have you here. You haven't given us a written statement, so if you would keep your remarks to about 10 minutes so to leave time for questions.

Same with you, Mr. Dozier. When is the film coming?

Mr. DOZIER. Whenever you want it.

Mr. REID. Whatever you decide.

Dr. Paulson, please continue.

STATEMENTS OF LARRY PAULSON, PH.D., UNIVERSITY OF NEVADA, LAS VEGAS; L. DOUGLAS JAMES, PROFESSOR, UTAH STATE UNIVERSITY; LARRY DOZIER, BUREAU OF RECLAMATION

Mr. PAULSON. If I might, I'd like to show just one slide, but before I do, let me give you a little overview of some testimony that I gave in Needles before the House Committee on Interior and Insular Affairs. At that committee I made a recommendation that the Army Corps of Engineers and Bureau of Reclamation make some changes in the flood control regulations for Lake Mead and Hoover Dam.

Commissioner Broadbent has already indicated the 5.5 million acre-feet are required in reservoirs on the 1st of April. Now if we had space upstream it can be credited against that in Lake Mead provided one and a half million acre-feet are always available in Lake Mead Reservoir.

I recommended that we go back to a modified version of the old flood control plan called a Debler plan that we have used on Lake Mead from 1935 to 1957. That plan required that we have 9½ million acre-feet available in the reservoir on the 1st of April.

Now the reason for that is because the forecasting from January to April is very uncertain so essentially you clear a little more space during spring period to provide for a little more operational flexibility in the event you receive high runoff.

Well, in terms of adopting that particular strategy on the two reservoirs, multireservoir system, now I suggested that we split the space requirement equally between Lake Powell and Lake Mead such that 4.75 million acre-feet would be available in Lake Powell and 4.75 in Lake Mead on the 1st of April.

I also recommended that we try to hold the discharge out of Hoover at 28,000 CFS to avoid powerplant bypasses and keep from flooding people were the main reasons.

The Bureau of Reclamation made a simulation of that proposal, general proposal, in late September and got back to me and indicated that they didn't feel that it would have significantly reduced flooding, nor would it have enhanced power production or given them enough operational flexibility in the system.

I found that awful difficult to accept given that we were able to operate Hoover Dam for all those years in the interest of flood control and other management objectives and do quite well.

What I did was do a simulation myself, making some changes in the rule of curve which is the key to these flood control plans.

If I could have the first slide, I'd like to show you how I proposed we should operate. If you will take a look there, at the left-hand side of that graph you see the rule curve that was used on Lake Mead according to original Debler plan. This required 2½ million acre-feet in the reservoir on the 1st of August and then it was progressively drawn down such that on the 1st of April 9½ million acre-feet were available for flood storage.

The plan that's currently used in Lake Mead is the 1982 plan there in the second column, now it requires that we draw down to get the 5.35 on the 1st of January. Then everything is based on forecasting.

Now when the Bureau did their simultation I believe that they followed kind of a modified Debler plan that drew down both reservoirs simultaneously. That causes high releases down below Hoover Dam because you have the space building releases from Powell plus any inflows plus space building releases from Mead downstream of Hoover Dam.

What I would suggest would be a rule curve that's listed as the modified Debler over there on the right-hand side where we draw Lake Mead down pretty much like it is right now and get it down to 4.75 million acre-feet on the 1st of December, hold it at that level, then go up on Powell and start creating space in that reservoir such that we get 4.75 on Powell for a total of nine and a half on the 1st of April.

I made a couple of simultations using that particular rule curve. Using that rule curve and briefly what it showed was that it wouldn't have helped that much on Lake Powell. Discharge from Lake Powell in June or July and August of 1983 would still have been very high. This likely would have caused spillway damage at Glen Canyon Dam from the high July discharges.

I indicated at my testimony in Needles that most of the flood control storage space on the Colorado River system should be available in Lake Powell. It's the headwater impoundment on the system now and the flows must first be routed through that reservoir before being passed downstream. Glen Canyon Dam is only capable of discharging about 45,000 cubic feet per second through the powerplant and outlet works combined.

Now that's a pretty serious problem when you figure the Colorado River can routinely dish out a 100,000 cubic feet per second so it's awful hard to respond to high peak inflows or keep pace with high spring runoff when you have that kind of a limitation.

The only way to counteract that problem is to build more space in the reservoir earlier in the season. That's the only way. So even though modified Debler plan didn't help, I think we should have more space up in that reservoir. There's some political and legal restraints on that but I hope we can overcome those because I think it's crucial from the standpoint of protection of that dam. From the standpoint of Lake Mead and downstream conditions, the modified Debler plan would have reduced discharges out of Lake Mead to about 30,000 cubic feet per second. This would have probably caused some flooding in Parker Strip area but it would have been significantly reduced over what we had in 1983.

In addition to I think meeting the objectives of minimizing flood damage here, the modified Debler plan would have met the operating criteria at least from the standpoint of the equalization provision which it's called which applies in years we have surplus water. It would have provided for ample reservoir storage, would not have depleted the reservoirs, and it would have significantly reduced the powerplant bypasses.

The Bureau estimates that we bypassed about little over 12 million acre-feet of water this year past the generators. The modified Debler plan based on my simulations would have reduced this to about 5—little over 5 million acre-feet. That's a net difference of seven million acre-feet in powerplant bypasses.

I don't know what the power is worth but I will tell you that's about 80 percent of the net average flow that passes through these powerplants. That's a tremendous loss of revenue there, so I think the modified Debler plan meets the objectives of a good flood control plan and also allows us to maintain enough storage, and generate power.

Commissioner Broadbent indicated that you have two peaking seasons mainly, one wintertime, one summertime. The rule curves that I showed there would allow peaking in both of those seasons.

I have one other thing I'd like to briefly touch on, I think the modified Debler represents a short-term solution to our immediate problems. I think there's some long-range problems in the Colorado River Basin that need to be addressed. Numerous individuals have suggested that we need to have some sort of a Colorado River Commission established to sit down and try to develop a long-range management plan for the Colorado River.

I certainly endorse that, in fact Dr. James and I tried to form such a committee a couple of years ago among the scientific community or among the scientists in the basin.

I think there's a number of talented individuals in this basin that could assist the Federal agencies in establishing a really integrated management program for the Colorado River and I would encourage the congressional committee to take a look at that.

Basically that's a brief overview of what I had to say.

[The prepared statement of Dr. Paulson follows:]

Testimony of Dr. Larry J. Paulson
Presented to House Committee on
Science and Technology, Subcommittee
on Investigations and Oversight
14 October, 1983, Las Vegas, Nevada

Mr. Chairman and Members of the Committee:

I am a Research Professor and Director of the Lake Mead Limnological Research Center at the University of Nevada, Las Vegas. I received a Bachelor of Science Degree in Biology from the University of Nevada, Las Vegas on 9 May, 1972; a Master of Science Degree in Ecology/Limnology from the University of California, Davis on 14 June, 1975 and a Ph.D in Ecology/Limnology from the University of California, Davis on 9 September, 1977. I joined the faculty at the University of Nevada, Las Vegas in November, 1977.

My research specialty is limnology - the study of physical, chemical and biological properties of freshwater lakes and reservoirs. I have conducted numerous limnological studies for the Bureau of Reclamation, Environmental Protection Agency, Fish and Wildlife Service and state agencies. The principal purpose of my research is to assist the agencies in solving various management problems of the Colorado River. I have knowledge of the matters before the committee and wish to offer the following statements to assist in your investigations of the flooding that occurred in the Colorado River during 1983.

In testimony that I presented before the House Committee on

Interior and Insular Affairs at Needles, California on 8 September, 1983, I recommended that the Bureau of Reclamation and Army Corps of Engineers make changes in the flood control plan currently used for the Colorado River. I proposed that a modified version of the Debler (1930) flood control plan, which was used on Lake Mead from 1935 - 1957, be restored on the reservoir system. The basic elements of the modified Debler plan would require that a total of 9.5 million acre-feet of flood control storage space be available in the reservoir system on 1 April. This flood control space should include at least 4.75 million acre-feet in Lake Powell below elevation 3700 feet and 4.75 million acre-feet in Lake Mead below elevation 1229 feet. Creditable storage could be applied if space were available in upstream reservoirs. Space building releases from Lake Mead should be made to limit flows to 28,000 CFS below Davis and Parker Dams. The 1 August flood control requirement of 1.5 million acre-feet in Lake Mead should remain as it is specified in the 1982 flood control plan.

Bureau officials recently ran a version of the modified Debler plan through the Colorado River Simulation System (CRSS) model to determine if it would have helped minimize this year's flooding in the lower river. A narrative summary of the Bureau's findings is presented in Appendix A. Bureau officials concluded that operation by the modified Debler plan would not have reduced flood damages, nor would it have enhanced power production or provided sufficient operational flexibility. It is difficult to accept those conclusions considering the fact that operation of Lake Mead by the original Debler plan was extremely effective in controlling floods and meeting other management objectives during the period from 1935 - 1957.

The problem here stems largely from the Bureau's selection of a rule curve for building flood control storage space in the reservoirs. In their model simulation, bureau officials apparently followed a rule curve similar to that specified in the original Debler plan (Table 1) and simultaneously built flood control storage space in Lake Mead and Lake Powell. This results in high flows below Hoover Dam during winter and early spring because the space building releases from both reservoirs, plus winter inflows must be passed downstream. This problem can be minimized by first building space in Lake Mead and then in Lake Powell.

The rule curve that seems most suitable for such operations is one that incorporates elements of the original Debler plan and the 1982 flood control plan (Table 1). By this rule curve, releases from Lake Mead would be made during late summer and fall to reach the 4.75 million acre-feet space requirement on 1 December. Releases from Lake Powell would be made during winter and early-spring to reach its 4.75 million acre-feet requirement on 1 April. Reservoir operations thus would be governed by the rule curve rather than uncertain forecasts early in the season.

The space building releases from Lake Powell, plus winter inflows would be passed through Lake Mead during winter and early spring to achieve the 9.5 million acre-feet total space requirement on 1 April. If winter releases from Lake Powell would require discharges from Hoover Dam greater than 28,000

Table 1. Fixed-rule space requirements (millions of acre-feet) for various flood control plans.

	Plan				
	Debler (1930)	1982	Modified Debler		
Date	Lake Mead[a]	Lake Mead[a]	Lake Mead[a]	Lake Powell[b]	Total
1 August	2.500	1.500	1.500	-	1.500
1 September	2.500	2.270	2.270	-	2.270
1 October	2.500	3.040	3.040	-	3.040
1 November	3.175	3.810	3.810	-	3.810
1 December	4.463	4.580	4.750	-	4.750
1 January	5.850	5.350	4.750	1.100	5.850
1 February	7.260	c	4.750	2.510	7.260
1 March	8.445	c	4.750	4.010	8.760
1 April	9.500	c	4.750	4.750	9.500

a) Space below elevation 1229 ft.

b) Space below elevation 3700 ft.

c) Based on inflow forecasts.

CFS, the surplus could be stored as carry-over in Lake Mead, provided it did not exceed 10% of the flood control space requirement, or 475,000 acre-feet. In the event that releases from Lake Powell significantly exceeded the inflows or the modified Debler space requirements, the surplus could again be stored as carry-over in Lake Mead. Lake Mead would thus serve as a buffer or re-regulation reservoir to provide greater operational flexibility during winter and early spring months.

The operations of Lake Powell and Lake Mead under this plan were simulated for water years 1983 and 1984. It was necessary to make several assumptions in order to run the simulations. I assumed that there was no storage space available in reservoirs upstream from Lake Powell. The actual, unregulated inflows into Lake Powell were used in simulations for water year 1983, and normal, unregulated inflows were used for water year 1984 (1). I allowed for surcharge storage in Lake Powell up to levels used by the bureau in 1983. Releases from Glen Canyon Dam during October, 1982 - March, 1984 were made at historical 1983 levels, or to meet modified Debler space requirements or to avoid power plant by-passes. Releases from Glen Canyon Dam during April - September, 1984 were based on monthly averages for the 1970 -1982 period (2). Similar operating criteria were followed at Hoover Dam, except that discharges were kept at or below 28,000 CFS as much as possible. Releases from Lake Mead during April - September, 1984 were based on average monthly water demands (3). Reservoir storage was not adjusted for bank storage.

Operations of Lake Powell under the modified Debler plan would have resulted in higher discharges from Glen Canyon Dam during February and March, 1983 (Fig. 1, Appendix Table A). Reservoir storage would have been considerably lower during March and April (Fig. 2). This would have provided greater space to handle the high June inflows. Discharges from Glen Canyon Dam during June would have decreased from actual levels of 57,500 CFS to 45,509 CFS (Fig. 1). A slight decrease in discharges also would have occurred during July. Discharges of about 30,000 CFS during January and February, 1984 would be necessary to meet modified Debler space requirements (Fig. 1). This would decrease the volume of Lake Powell to 20.252 million acre-feet (elevation 3668.4 feet) at the end of March, 1984 (Fig. 2, Appendix Table A). The volume would increase to 24.276 million acre-feet by the end of July, 1984, assuming normal inflows occur during the spring of 1984.

Operations of Lake Mead by the modified Debler plan would have required higher discharges from Hoover Dam during the fall of 1982 and spring of 1983 (Fig. 3, Appendix Table B). Discharges from Hoover Dam during July and August, 1983 would have been 30,000 CFS, compared to actual levels of 39,000 - 42,000 CFS (Fig. 3). Discharges from Hoover Dam would average about 25,000 - 27,000 CFS during the fall of 1983 and winter of 1984 and then decrease to 12,000 - 16,000 CFS for the rest of the year (Fig. 3).

The volume in Lake Mead would have averaged about 22.7 million acre-feet (elevation 1198.5 feet) during the fall of 1982 and winter of 1983 (Fig. 4). The volume would have

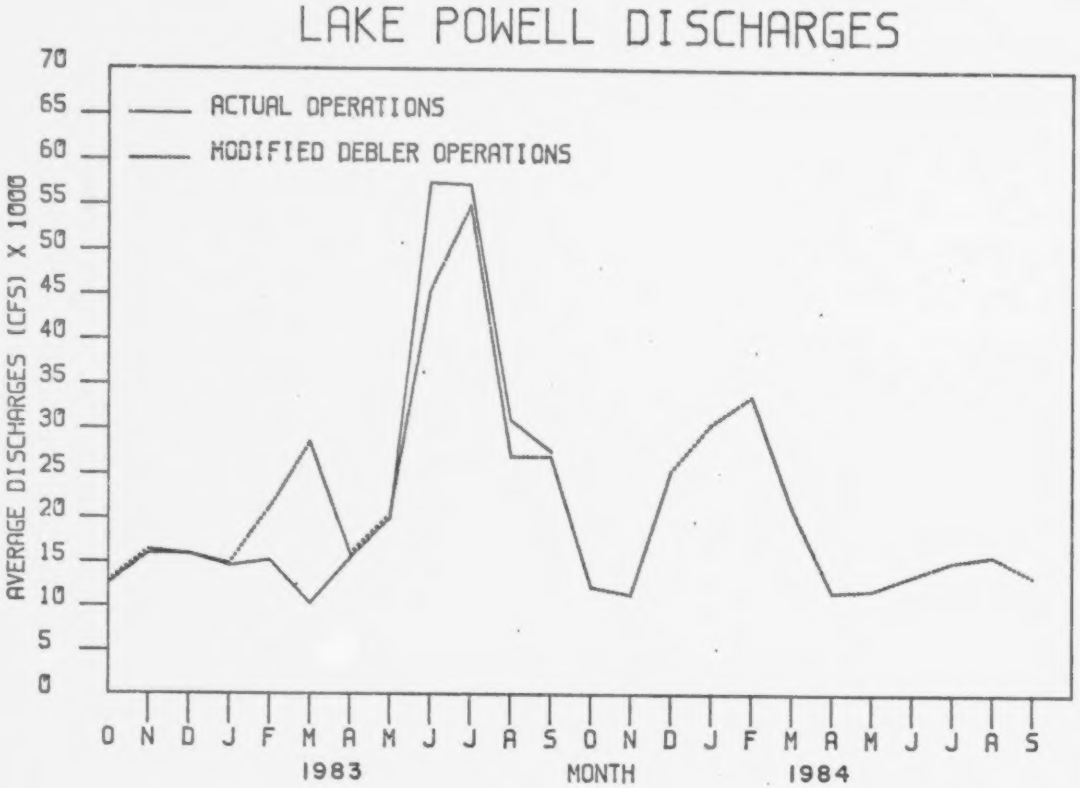

Figure 1. Comparisons of actual discharges (CFS) from Lake Powell with those simulated under operations by the modified Debler plan during water years 1983 and 1984. (Sources: Bureau of Reclamation provisional estimates and Appendix Tables A and B.)

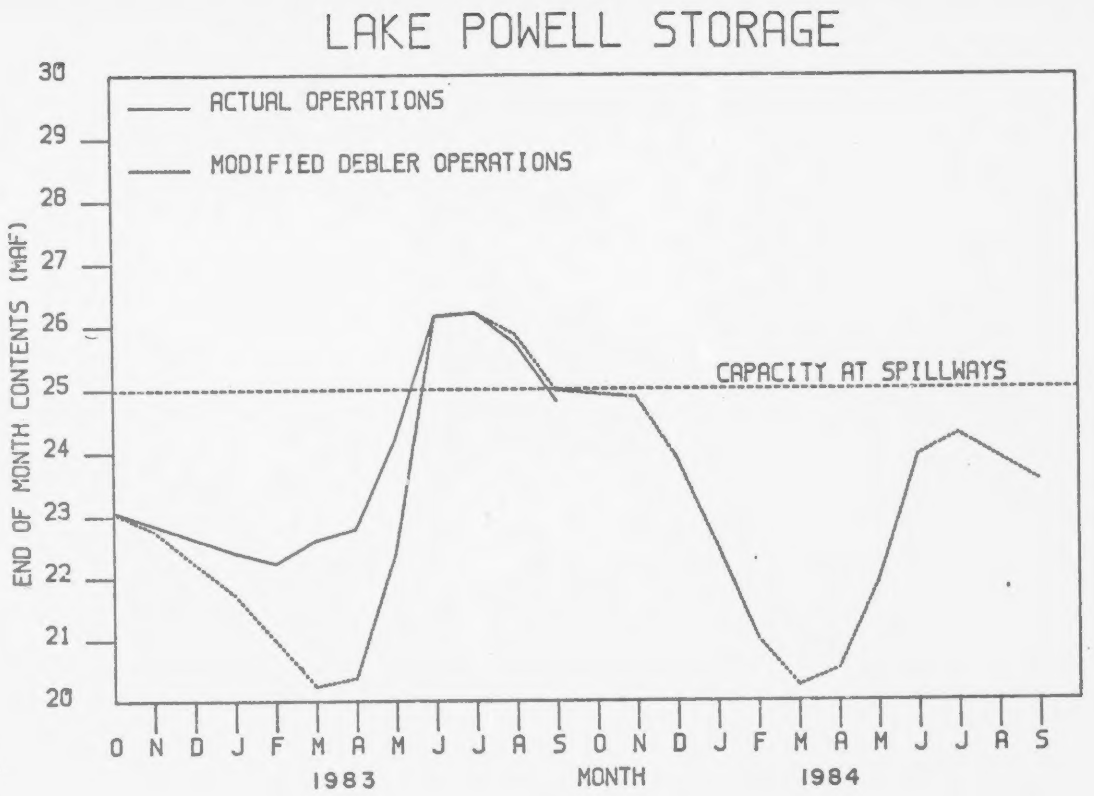

Figure 2. Comparisons of actual end of month contents (millions of acre-feet) in Lake Powell with those simulated under operations by the modified Debler plan during water years 1983 and 1984. (Sources: Bureau of Reclamation provisional estimates and Appendix Tables A and B.)

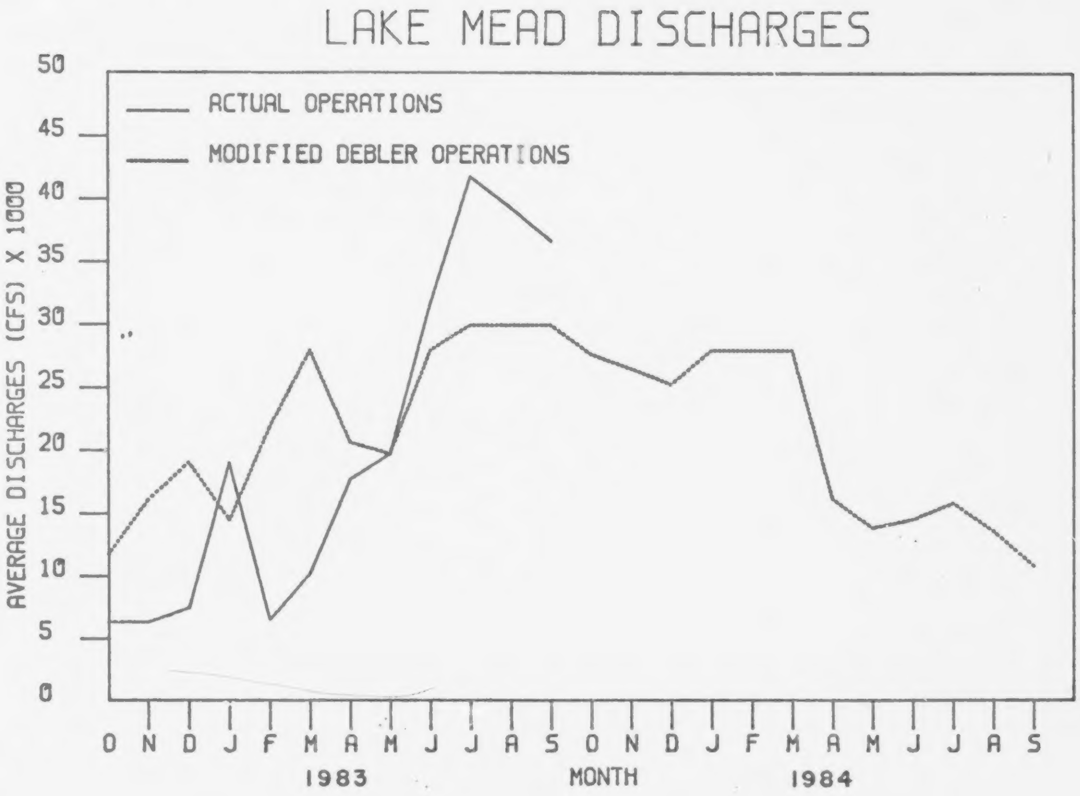

Figure 3. Comparisons of actual discharges from Lake Mead with those simulated under operations by the modified Debler plan during water years 1983 and 1984. (Sources: Bureau of Reclamation provisional estimates and Appendix Tables A and B.)

increased to 25.184 million acre-feet (elevation 1215.1 feet) by the end of July, 1983 (Appendix Table B). This is more than 6 feet below the level of the spillways and about 11 feet below actual elevations reached in 1983. Volumes would have decreased during fall, 1983 and stabilized at about 22.7 million acre-feet for the rest of water year 1984 (Fig. 4). The slight increase in volume during February, 1984 (Fig. 4) was caused by carry-over storage from Lake Powell.

Operations of Lake Powell and Lake Mead by the modified Debler plan using the rule curve specified in Table (1) would have kept discharges from Hoover Dam at or below 30,000 CFS. Flood damages from surface waters and levee seepage would have been avoided in the river reach between Davis Dam and Lake Havasu. Discharges below Parker Dam would have been reduced to about 28,000 CFS due to diversions above Parker Dam. This would have caused some flooding in the Parker Strip area, but damages would have been greatly reduced in this reach and in downstream areas.

The recreation industry in the lower river could have operated at the lower discharges from Hoover Dam. This would have reduced the tremendous economic losses suffered by concessionairs in the lower river. Similarly, the negative impacts on recreation at Lake Mead would have been minimal because lake elevations would have been kept below levels that cause significant damage to National Park Service and marina facilities.

The modified Debler plan also would have helped reduce

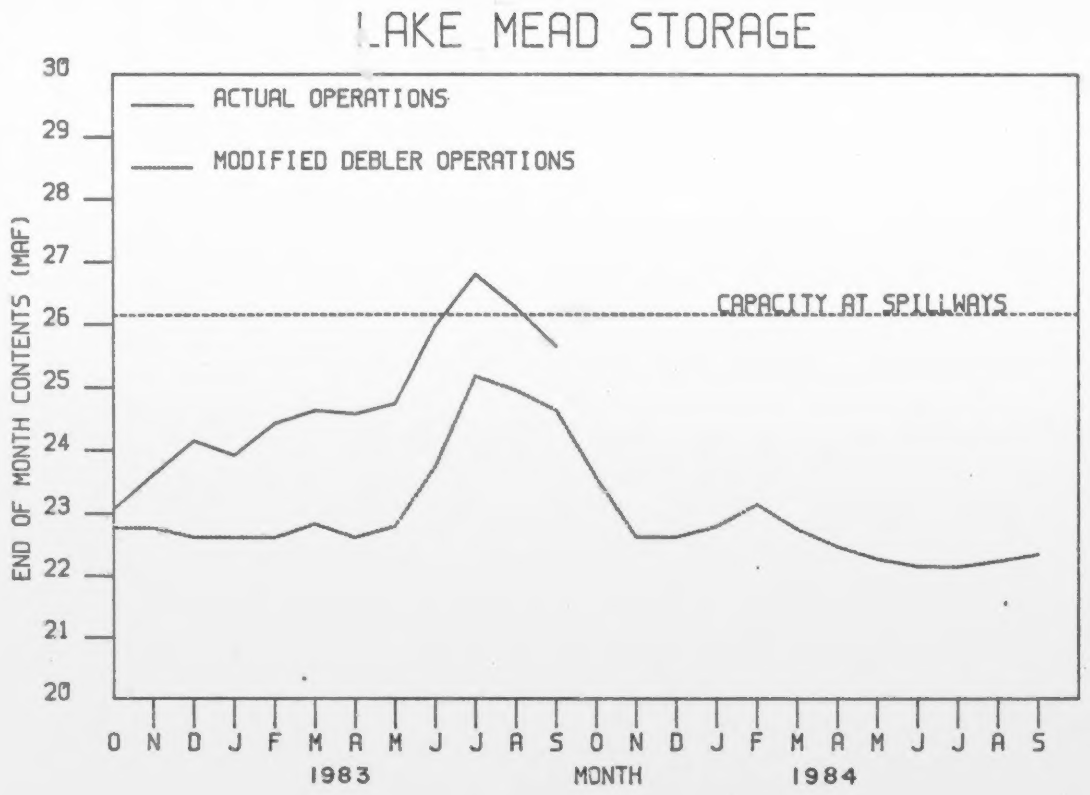

Figure 4. Comparisons of actual end of month contents (millions of acre-feet) in Lake Mead with those simulated under operations by the modified Debler plan during water years 1983 and 1984. (Sources: Bureau of Reclamation provisional estimates and Appendix Tables A and B.)

damages to the spillways at Glen Canyon Dam. The June discharges would have been reduced to about 45,000 CFS, most of which could have been passed through the powerplant and outlet works. However, significant spillway damage would probably still have occurred from the high discharges during July. I pointed out in my testimony in Needles that most of the flood control storage space should be made available in Lake Powell because it now serves as principal regulation reservoir in the system. Discharges from Glen Canyon Dam are limited to about 45,000 CFS through the outlet works and powerplant (3). This makes it extremely difficult to keep pace with high spring runoff or to respond to high peak inflows. The only way to counteract this problem is to build more space in the reservoir early in the season. Legal and political constraints appear to make such operations impractical. Spillway releases from Lake Powell will be a common occurrence unless these constraints can be overcome.

Operations of Lake Powell and Lake Mead by the modified Debler plan would have provided for ample water storage in the reservoirs. The combined Lake Powell/Lake Mead system would have been at 97% of capacity (below spillways) on 30 September, 1983 and 89.7% of capacity on 30 September, 1984. The modified Debler plan would have met the storage equalization provisions of the 1970 Long-term Operating Criteria. The volumes in Lake Powell and Lake Mead were nearly equal at the end of water years 1983 and 1984 (Appendix Tables A and B).

The modified Debler plan also would have reduced powerplant by-passes. The bureau estimates that a total of 2.089 million acre-feet were by-passed at Hoover Dam, 2.984 million acre-feet at Davis Dam and 3.379 million acre-feet at Parker Dam during 1983 (Table 2). A total of 3.925 million acre-feet of by-passes occurred at Glen Canyon Dam. Powerplant by-passes would have been avoided at Hoover Dam and reduced to 2.832 million acre-feet at Glen Canyon Dam, .819 million acre-feet at Davis Dam and 1.781 million acre-feet at Parker Dam under operations by the modified Debler plan (Table 2). This represents a decrease in total powerplant by-passes of nearly 7 million acre-feet at the four dams. That is a tremendous loss in power revenues considering that the difference in the by-passes represents about 80% of the average net flows in the river.

The modified Debler plan meets all the major objectives required for multi-purpose management of the Colorado River. It seems to represent a reasonable operating strategy for solving our short-term management problems. There is, nonetheless, a critical need for a careful review of long-term operating strategies. Several individuals, including myself, have suggested that a Colorado River Commission needs to be established to formulate a long-term plan for river management. Such a commission should be comprised of water and power users, managers, and knowledgeable members of the public and scientific community from the Colorado River Basin states. The commission could help the bureau and other agencies identify problems, assess research findings, develop management alternatives and advise decision makers of the tradeoffs associated with implementaion of various management programs. I believe that the commission could serve a vital role in the continued development

Table 2. Comparisons of actual power plant by-passes (millions of acre-feet) in 1983 with those estimated for operations under the modified Debler plan (estimates based on Bureau of Reclamation provisional records and Appendix Tables A and B).

	Dam/Power Plant							
	Glen Canyon Dam[1]		Hoover Dam[2]		Davis Dam[3]		Parker Dam[4,5]	
Month/Year	Actual	Modified Debler	[illegible]	Modified Debler	Actual	Modified Debler	Actual	Modified Debler
January 1983	-	-	-	-	-	-	-	-
February 1983	-	-	-	-	-	-	-	-
March 1983	-	-	-	-	-	.092	-	.264
April 1983.	-	-	-	-	-	-	-	-
May 1983	-	-	-	-	-	-	-	-
June 1983	1.815	1.101	-	-	.260	.089	.313	.264
July 1983	1.862	1.722	1.167	-	1.035	.215	1.089	.411
August 1983	.248	-	.910	-	.879	.215	1.033	.422
September 1983	-	-	.012	-	.810	.208	.944	.420
Total	3.925	2.832	2.089	0	2.984	.819	3.379	1.781

---

1) Glen Canyon Dam by-passes occur at 27,000 CFS at elevation 3700 ft.

2) Hoover Dam by-passes occur at 39,000 CFS.

3) Davis Dam by-passes occur at 26,500 CFS.

4) Parker Dam by-passes occur at 21,500 CFS.

5) Estimated from Hoover Dam discharges minus average diversions.

and utilization of the valuable resources in the Colorado River.

REFERENCES

(1). Colorado River Simulation System Model, U.S. Bureau of Reclamation, Lower Colorado River Regional Office, Boulder City, Nevada. September, 1983.

(2). Final Environmental Assessment for Glen Canyon Powerplant Uprating. U.S. Bureau of Reclamation, Upper Colorado River Regional Office, Salt Lake City, Utah. November, 1982.

(3). Water Control Manual for Flood Control, Hoover Dam and Lake Mead, Colorado River. U.S. Army Corps of Engineers. December, 1982.

Appendix A.

United States Department of the Interior

BUREAU OF RECLAMATION
LOWER COLORADO REGIONAL OFFICE
P.O. BOX 427
BOULDER CITY, NEVADA 89005

IN REPLY REFER TO LC-400
410.

SEP 23 1983

Dr. Larry Paulson
University of Nevada Las Vegas
4505 South Maryland Parkway
Las Vegas, Nevada 89109

Dear Dr. Paulson:

At our meeting on September 20, 1983, we discussed the results of theoretical operations of the Colorado River during 1983 and 1984 using the modified Debler Plan, as proposed in your testimony before the House Interior and Insular Affairs Committee in Needles, California, on September 9, 1983. For your further information, enclosed is a complete copy of the CRSS 24-month Model Study results and a copy of a written Summary of Analysis.

Please contact Mr. Larry Dozier at 293-8414 or Mr. Alden Briggs at 293-8677 if you have further questions on the model results.

Sincerely yours,

ACTING FOR Robert A. B.

N. W. Plummer
Regional Director

Enclosure

Appendix A. (Cont.)

SUMMARY ANALYSIS OF THE THEORETICAL OPERATIONS OF THE COLORADO RIVER UNDER MODIFIED DEBLER PLAN 1983-1984

Starting on January 1, 1983, there was 6.57 million acre-feet (maf) of available storage space. This is more than the 5.85 maf required by the Debler Plan. To reach the target levels of 8.44 maf on March 1 and 9.50 maf on April 1 would have required releases of 30,900 cubic feet per second (cfs) in February 1983 and 37,900 cfs in March 1983. Releases in April and May are assumed to be only those required for downstream uses. With 9.5 maf available space on April 1 and forecasted inflow as actually given on April 1 and May 1, 1983, no additional releases would have been justified.

As the forecast changed drastically during June, it was assumed that release rates would have been about the same as those actually experienced, i.e., releases would have reached approximately 40,000 cfs by late June. The average release for June would have been 31,500 cfs. During July it was assumed that releases would have been made to avoid surcharge at Lake Powell and to reach August 1 with 1.5 maf available space in Lake Mead (elevation 1219.6) as required by both the modified Debler Plan and current flood control regulations. Releases at Lake Mead would have continued at approximately 40,000 cfs in early July and would have tapered off as inflows decreased. July releases would average 38,000 cfs. In August releases would average 33,500 cfs.

With higher than normal fall inflows, releases would range from 22,200 to 28,500 cfs to reach the target level of 5.85 maf of available space on January 1, 1984. It was assumed that normal runoff and normal downstream requirements would occur in 1984. Releases would average 30,000 cfs in January, February, and March 1984 to reach the target level of 9.5 maf available space on April 1, 1984. With a normal year, releases for downstream demands during the remainder of 1984 would provide about 5.99 maf on January 1, 1985 or more than the target level of 5.85 maf. The cycle would then repeat, changing as necessary, depending on the level of inflows.

It is interesting to note that space building in January to March would routinely require releases of 27,000 to 32,000 cfs on the strict Debler rule curve. To empty space from 5.85 maf on January 1 to 9.50 maf on April 1 (i.e., 3.65 maf) requires average releases of 20,000 cfs for 3 months, plus passing any inflows. Inflows usually range from 6,000 to 12,000 cfs in this period. During these winter months irrigation diversions are low, as are losses from evaporation. These flow levels would require powerplant bypasses at Davis and Parker Dams, would create substantially increased river levels at Yuma, and would flood lowlands in Mexico near the confluence with the Rio Hardy. In addition, peak power needs occur in April to August, not in January to March.

Obviously, operation under the strict rule of the modified Debler Plan would not provide operational flexibility, enhance power production, or prevent high river flows. In the exceptional year of 1983, this plan would still have required flows of 38,000 to 40,000 cfs for the month of March and 4 to 6 weeks in June and July. It appears that essentially the same level of flood damage would have occurred to residents along the river.

Appendix Table A. Simulated operations for Lake Powell under the modified Debler plan during water years 1983 and 1984.

Month/Year	Unregulated Inflows (MAF)	Net Evaporation Losses (MAF)	End of Month Contents (MAF)	Discharges (MAF)	Discharges (CFS)
October 1982	.884[1]	.057	23.040	.792[1]	12,881[1]
November 1982	.658[1]	.047	22.676	.975[1]	16,385[1]
December 1982	.574[1]	.039	22.235	.976[1]	15,873[1]
January 1983	.438[1]	.029	21.730	.914[1]	14,865[1]
February 1983	.466[1]	.027	20.992[2]	1.177	21,193
March 1983	1.046[1]	.033	20.252[2]	1.753	28,510
April 1983	1.124[1]	.037	20.388	.951[1]	15,982[1]
May 1983	3.314[1]	.054	22.389	1.259[1]	20,476[1]
June 1983	6.559[1]	.069	26.171[3]	2.708	45,509
July 1983	3.513[1]	.078	26.224[3]	3.382	55,003
August 1983	1.379[1]	.079	25.864[3]	1.660	27,000[4]
September 1983	.800[1]	.067	24.990	1.607	27,000[4]
Water Year 1983	20.755	.616	+ 1.985	18.154	25,076
October 1983	.750[5]	.060	24.930	.750[6]	12,198[6]
November 1983	.675[5]	.050	24.880	.675[6]	11,344[6]
December 1983	.625[5]	.041	23.902[2]	1.562	25,403
January 1984	.500[5]	.030	22.492[2]	1.880	30,575
February 1984	.400[5]	.028	20.991[2]	1.873	33,725
March 1984	.600[5]	.033	20.252[2]	1.306	21,240
April 1984	.995[5]	.037	20.520	.690[5]	11,596[5]
May 1984	2.175[5]	.053	21.911	.731[5]	11,889[5]
June 1984	2.900[5]	.065	23.943	.803[5]	13,495[5]
July 1984	1.335[5]	.074	24.274	.930[5]	15,125[5]
August 1984	.670[5]	.075	23.901	.968[5]	15,743[5]
September 1984	.500[5]	.063	23.541	.797[5]	13,394
Water Year 1984	12.125	.609	- 1.449	12.965	17,908

1) Historical 1982-83 operations
2) Debler space requirement below elevation 3700 ft.
3) Surcharge storage in 1983
4) Maximum to avoid power plant by-passes
5) Normal conditions
6) Pass inflows

Appendix Table B. Simulated operations for Lake Mead under the modified Debler plan during water years 1983 and 1984.

Month/Year	Inflows (MAF)		Losses (MAF)		End of Month Contents (MAF)	Discharges	
	Glen Canyon Dam	Tributaries	Gross Evaporation	Diversions		(MAF)	(CFS)
October 1982	.792[1]	.016	.074	.011	22.766	.723[4]	11,758[4]
November 1982	.975[1]	.069	.074	.009	22.766	.961[4]	16,150[4]
December 1982	.976[1]	.130	.063	.008	22.627[2]	1.174	19,093
January 1983	.914[1]	042	.052	.008	22.627[2]	0.896	14,572
February 1983	1.177	.097	.047	.008	22.627[2]	1.219	21,949
March 1983	1.753	.251	.054	.010	22.845[3]	1.722	28,000
April 1983	.951[1]	.141	.066	.012	22.627	1.232	20,704
May 1983	1.259[1]	.229	.077	.013	22.809	1.216[1]	19,776[1]
June 1983	2.708	.005	.095	.015	23.746	1.666	28,000
July 1983	3.382	.043	.124	.018	25.184	1.845	30,000
August 1983	1.660	.113	.131	.017	24.964	1.845	30,000
September 1983	1.607	-.019[6]	.107	.014	24.646	1.785	30,000
Water Year 1983	18.154	1.117[1]	.964	.143[1]	+1.880	16.284	22,493
October 1983	.750	-.037[6]	.075	.014	23.567[2]	1.703	27,697
November 1983	.675	.051	.073	.011	22.627[2]	1.582	26,586
December 1983	1.562	.067	.063	.009	22.627[2]	1.557	25,322
January 1984	1.880	.068	.052	.009	22.792[3]	1.722	28,000
February 1984	1.873	.095	.048	.008	23.149[3]	1.555	28,000
March 1984	1.306	.080	.053	.008	22.752[3]	1.722	28,000
April 1984	.690[5]	.064	.066	.012	22.465	.963[5]	16,184[5]
May 1984	.731[5]	.016	.076	.015	22.267	.854[5]	13,889[5]
June 1984	.803[5]	.054	.091	.015	22.152	.866[5]	14,554[5]
July 1984	.930[5]	.163	.114	.017	22.137	.977[5]	15,889[5]
August 1984	.968[5]	.102	.121	.017	22.233	.836[5]	13,596[5]
September 1984	.797[5]	.072	.100	.014	22.344	.644[5]	10,823
Water Year 1984	12.965	.795[5]	.932	.149[5]	-2.302	14.981	20,693

1) Historical 1982-83 Operations
2) Modified Debler space requirement below elevation 1229 ft.
3) Lake Powell carry-over to keep average Hoover Dam discharges at 28,000 CFS
4) Pass inflows
5) Normal conditions
6) Gage problem

Mr. **Reid**. We of course have questions for you. We would like to wait until the other panelists are finished. I have some questions I have been wanting to ask you for some time.

Professor James, if you don't mind, because I at least personally am not as familiar with you as I am with Dr. Paulson, could you give us your background briefly?

Mr. **James**. I'm certainly very happy to be here. I'm Douglas James, director of the Utah Water Research Laboratory, Utah State University. I have a hydrology background with advanced degrees from Stanford University. Twenty-one years of experience at Georgia Tech before coming to Utah State 7 years ago and director of research laboratories since then.

Utah State is in consortium with water institute directors with the college in each one of the States in the Colorado River Basin and has been involved over the years in a number of different research projects related to water management in the basin including University of Nevada and that's contact with Dr. Paulson that was mentioned a moment ago.

I think what I'd like to give here is just my observations and later on I will submit my written testimony after I get a chance to get it organized.

Mr. **Reid**. Fine.

Mr. **James**. We have here in 1983 a new situation, the reservoirs are full, the water is not being completely used because of certain delays in consummation of the allocation and a particular year in which was very wet with the wetness concentrated toward the end of the year.

In this situation we have a fairly complicated technical trade off between use of the storage space for flood control and use of the storage space for water supply.

Commissioner Broadbent mentioned a number of aspects of this and to try to deal with it as a very complicated situation, both technically and as constrained by various political and legal constraints, and it would keep hearing of the political, legal constraints and certainly they are very important and certainly the committee is to be mentioned for its role in thinking about these, to see if there's any ways in which these constraints are causing problems and whether something needs to be expedited to overcome those problems, whatever they might be. But we do have a technical problem in how best to balance use of reservoir storage of flood control versus use for water supply.

The key to dealing with this problem is somewhat in the political constraints but also in that of management, in obtaining information, better information, quicker information perhaps by going to forecasts instead of just observing what's on the ground in terms of snow, soil moisture and all the other things which hydrology affects the runoff also going to occur later and we are getting into an area whereby use of information of satellites and other advances in technology, we can get this information more quickly, earlier use forecasts and integrate it into the models.

If I were to try to put together these comments into just an observation, a recommendation, I think it would go with what Dr. Paulson just said, that not too many years ago we had a situation in the country with respect to dam failures, some dams failed, and

Bureau of Reclamation went through an analysis of that and one of the outcomes of it was four major structures and a dam safety review panel consisting of various people who had expertise in line of endeavor that would contribute to making dams safer, would review the situation periodically and make technical recommendations which could then be expedited in the political framework.

And I would suggest that maybe this could also be used to advantage in the operation of a large reservoir system like we have in the Colorado River to establish a panel with this kind of expertise that would provide administration, ideas, and overviews and reviews not for the political part because I realize the importance of separate aspects of that, but of the scientific ways that could be used to separate the system more effectively or to bring in new techniques, whether they are data management, computer modeling, or whatever to improve the balance which is made between use of the reservoirs for flood control and use of water supply.

I will use that for my remarks. Thank you.

Mr. REID. Professor James, appreciate that very much.

Mr. Dozier, I think that probably because we have some live witnesses waiting, we are going to show your film after we finish the live testimony. It's on the spillway damage basically and doesn't fit in that well here. Is that okay with you?

Mr. DOZIER. That's fine.

Mr. REID. I certainly will miss it. I like a good movie.

Would you go forward with your testimony, please?

Mr. DOZIER. I'm Larry Dozier, Regional Supervisor of Water and Land Operations for the Bureau of Reclamation in Boulder City and under my supervision is the water scheduling branch that does have the direct responsibility for planning and scheduling the releases at all of the reservoirs from Hoover Dam on down.

They do the coordination with the water interests, the power interests, and actually do schedule the releases.

In addressing some remarks to the Science and Technology Committee I would just make a few general ones about what the Bureau is doing in that area.

The Colorado River as you have heard from Commissioner Broadbent's remarks and others is a very complex and diverse system and we do have some pretty complex river models and we can fairly accurately simulate what's going to happen on the river with a given set of assumptions.

We have very recently completed a long-term project of a new Colorado River simulation system model. We made efforts to get out and share that with other interested users along the river. We held some technical training sessions that dealt with all of the power and other users, the Fish and Wildlife, Bureau of Land Management, and other officials, and any other agencies along the river in use of that model. That is the model we have been using this year.

Any model of course is only as good as assumptions you put into it. This model has built into it many of the assumptions and limitations that come out of the law of the river and long-term operating criteria. It would make our job simple if we had a very rigid set of operating criteria that you could crank into your model and just like a cookbook, you put the situation in and the model says you have to do this. But we don't think that's always prudent to just rely totally on the the model and you need to look at alternatives and with events that have happened this year, that's what we have been doing, looking at a lot of alternatives.

Dr. Paulson's efforts with this committee and with others down river in the last few months has brought some other possibilities to light. In dealing with GAO, and I believe you have a copy of that report, we did do about six alternative studies on how you could have operated in 1983 with different sets of assumptions and different amounts of information. For our meetings with basin States yesterday we ran about 15 other different sets of alternative operations. These are just for 1- or 2-year periods.

Back when the corps was developing and working on revised flood control procedures they ran about 9 alternatives through 15 different historical hydrologic sequences to predict what might happen in the future. In establishing the long-range operating criteria, we run about 140 different runs at that time. Dr. Paulson has worked with us and I'd like to address a few remarks he gave us in his testimony yesterday and asked us to look at it and make some comment on it. It's another plan, another alternative that is essentially based on perfect hindsight, that you can go back and make some decisions now that you know what happened and manipulate that information so that you get the answer you want.

It doesn't follow the rule curve of the revised Debler plan but rather it begins last October to begin increased releases so that you have about 8 million acre-feet of storage space on January 1 rather than the 5.35. It continues building space in April and May when there was no logical reason to do so with the weather forecasts that were available at that time. Historically the April and May forecasts have been very accurate. His plan then creates sufficient space, so that later on in the year you can continue to hold your releases down.

It also sets up, by using a rather fixed-rule curve, a situation in which you are, in January, February, and March every year, vacating space from Glen Canyon and passing that through the system. So you're releasing about 20,000 CFS for vacating space. In addition you have 6 to 12,000 CFS of inflow to release during that period. So you force yourself into high releases every January, February, and March. For those of us in the lower basin, that's not really when we need the water or the power. We have our power needs as I'm sure you're well aware for air-conditioning in the hot weather season and for the irrigation needs during that period.

We will continue to look at and run any alternatives that are suggested. We will work with Dr. Paulson some more on this particular recommendation; however, to address some remarks and things we have talked about this morning, we did have a rather unique year this year.

We not only had full reservoirs, we had very unique weather events combined with that and had relatively low water demands going along with those weather patterns. Even with better data collection, there was nothing you could have done. I think you will hear from Dr. Clark's testimony later on, the snow wasn't there until late April, early May.

The weather conditions the rapid turnaround in temperature that caused the snow to melt rapidly, and later on the inch of rain over the basin did not happen until late May and on into June and until we have the ability to predict with great accuracy the weather into the future, we are going to have to use some sort of statistical base prediction for what's going to happen in the future and continue to operate on that basis, to go back in time and pick up a plan—well, to pick the high points, the fixed numbers out of a plan that worked some 20 years ago, and that plan at that time recognized changes in the basin, it recognized the requirement for lesser flood control releases or lesser flood control space in the future as the basin is developed, to try to pick fixed numbers out of that plan and stick those back in and live with them by today just flies in the face of progress and the fact that we must recognize that situations have changed.

I think what we are learning from this exercise, it is well to go back and look at the intents and goals of those people who have a long history of planning on the river, to look at the low of the river and operating criteia and look at the Debler plan and see what their intentions and their plans were and try to take those intentions and objectives and put them into today's setting and then use the best technology available to develop plans that will enhance those intentions, and those objections, and those goals and the long-term river planners saw as wise and were necessary.

Mr. Reid. Gentlemen, the first question would be to you, Mr. Dozier. As I understand what Dr. Paulson just told us, his plan is prospective in nature, futuristic in nature for lack of a better word, and you're talking about something that should have been done before. We have all agreed that we can't undo what's been done and we are not here to cast blame on what went on before. It's not going to do any good.

But the question as I heard Dr. Paulson pronounce it was that in the future his plan, the modified Debler plan, may prevent some of these problems, at least on a short-term basis. And rather than talk about his plan in the past, let's talk about in future. What objection do you have for his plan in the next year and year after?

Mr. Dozier. One of the best ways to test a plan for the future is to take it back historically and see how that plan would have worked when you run that historic event through with the facts that you knew at the time. We worked in an effort to do that in a realistic manner with the Debler plan. It provided very little help for a year such as 1983 with the late changes in the forecast. In other words, it tells you you have a unique event that is hard to predict.

Mr. Reid. But on the graph we were shown on whatever it is up there, it showed that under the present system we depend totally on weather forecasts. Under the system he proposed there would be a lot of output flow no matter what the weather was.

Mr. Dozier. Yes, looking at that in the future as to how it operates, you totally ignore the weather situation and whether we are in the middle of a wet winter, dry winter, or whatever you make large releases in January, February, and March to build space that you may have no need for, you may very well be in the middle of a dry year and you do that on a fixed rule curve rather than recognizing conditions that exist in the past and what you expect to occur in the future.

Mr. REID. If I understand his testimony, he in his own words—and I don't think I'm paraphrasing—said this is a short-term solution, and that there needs to be more in the long term. Could I have the response of Dr. James and Dr. Paulson to my question being, why do you disagree with what Mr. Dozier has said if, in fact, you do?

Mr. PAULSON. Well, I provided the backup information, very detailed documentation of my calculations here and the simulation that I did. As Larry indicated it neither uses perfect foresight or perfect hindsight. What I did for 1983 simultation was to use the actual unregulated inflows into Lake Powell in terms of how to make releases, you either make them to meet modified Debler space requirements in a reservoir to avoid powerplant bypasses or meet downstream requirements. That's as simple as it is in terms of Hoover Dam. I followed the same criteria there.

Now I made one judgment call, I said I'm going to keep the discharge to 28,000 CFS if I possibly can throughout the year. Some of the problems they pointed out, the Bureau official pointed out earlier about not having sufficient operational flexibility, I tried to address by providing a concept that called for carryover storage in Lake Mead in the event, for example, that we should release more water from Lake Powell than what was required to meet the Debler space requirements, which could happen, say, some sort of miscalculation or in the event the releases were higher than the inflows that actually came into the reservoir. So store it in Lake Mead for a month or two and then discharge it downstream.

I think there are a number of ways that operational flexibility can be built in with this plan to satisfy the objectives. The overriding factor here in the Colorado River Basin that we are talking about is this surplus water situation. We are going to have that and we have got to deal with that somehow in the future—for several years in the future as long as we have that.

I don't see the big problem in making a one-time depletion of the reservoirs of an additional 4, 5 million acre-feet for flood control, then operate the system at a lower steady state.

Mr. REID. Professor James.

Mr. JAMES. I haven't had an opportunity to review the proposed plan in detail but I think the comment that an operating scheme is evaluated by historically seeing how it performs with historical sequences is certainly right but also true you can't look at the historical sequence exactly as they were because you know information about present conditions that would cause a variation from repeating things exactly historically. And those two things would have to be put together in an analysis.

Mr. REID. One of the things that hasn't been talked about to any degree in the 3 days—this is the 4th day of hearings now—we have all talked about an excess of water.

Now we all know that there is going to come a time when we're going to have a drought up and down the Colorado River Basin, and we're going to have a shortage of water because that's what the Southwest is known for rather than having too much water, is not enough water, and with CAP on line, not just for crops but for personal water use in Arizona which will be the case more than it is now, and we have heard about Denver and Las Vegas and all that. Is there anything built into this for that purpose?

The reason I suggest that is it seems that we have had some serious problems with flooding, but the problems would be even more significant if we had not enough water to do those things that we need to do.

Mr. DOZIER. Congressman, that raises a very good point. As the Commissioner mentioned in earlier testimony, 1977 was about the lowest year on record and that was about 5 million acre-feet average annual flow. I think it's also interesting to note that was mentioned earlier that Lake Powell filled in about 1980. And on January 1, 1981, we had about the same amount of vacant space we had available on January 1, 1983, around 6½ million acre-feet of available space.

During the 1981 year we lost 5 million acre-feet in storage because of low runoff and high water use that year. We finished the year with in excess of 10 million acre-feet of vacant space to start in on the next year. We then just about filled up again in 1982.

Had 1981 been followed by another very dry year we would have been on that down cycle. As it was we started it with—we started the year with about 6½ million acre-feet of vacant space instead of closer to 10 million acre-feet of space which you might have had on April 1, if you had been on a fixed rule curve set up under something as this Debler plan. Would have started into a dry cycle at a lower point and, therefore, would have hit bottom that much sooner. I think we have the capability in the CRSS model to look at the historical sequences to take a classic hydrology look at what might happen if we start a dry cycle at this point or that point, or hit a wet cycle. It takes a little time but we propose to do that.

Mr. REID. Do either of you gentlemen have a comment?

Mr. PAULSON. Yes, I do. Again I think it's useful to take a look at historical conditions. At Lee's Ferry in 1953 we had annual flow—now net flow of 8.7 million acre-feet; 1954, 6.1; 1955, 7.3; 1956, 8.7.

Mr. REID. Those are real drought times?

Mr. PAULSON. Sustained drought periods. These are net after depletion but I think if you took a look back at that particular period, I haven't seen anything since in the record and I don't know what the probability, Larry, is of 4 years like that but that's probably the maximum that we could expect to have to go through given probability. So I'm really not that concerned that we are going to deplete our reservoir storage of 60 million acre-feet. This assumes we do nothing in the way of water conversation or take any other measure to accommodate a drought like they had to do in California for example in 1976 when the reservoirs were drawn down.

I think people adjust to the water situations that we have to deal with so I'm not real concerned that we are going to run out of water in the Colorado River.

Mr. REID. Professor James?

Mr. JAMES. In this particular year we do know last year was very wet. We do know that the probability of having a low sequence like that is even much lower now, probably zero, because we are in such wet conditions presently. One issue came up, can or how should we provide additional—how much additional space should we provide given we know that in the present time we are very likely to have a wet year follow and very unlikely to have a dry year follow and that amount of storage space would be different in what we would provide in ordinary years.

Mr. REID. Two more questions: First one, tell me the basic difference between modified Debler plan and the plan that Commissioner Broadbent suggested yesterday to the basin States.

Mr. DOZIER. The plan suggested yesterday to the basin States creates about 7½ million acre-feet of space on January 1, 1985. We are not going to be able to get there this year, but that's what it shoots for next year, then goes back to operating, to some degree, on the forecasts.

Mr. REID. Now the last question then, we have three scientists, we have heard a number of scientists before, either writing us letters or in testimony down in Arizona and California, and it seems quite clear that there is a scientific problem. There are many scientific complexities and choices involved in operating this river system. It would seem to me that the suggestion that has been offered, one that really gives me some thought that I think we should consider strongly, that there perhaps should be a scientific review group to look at what all these governmental agencies are doing up and down the river.

Now, Mr. Dozier, how do you feel about that, having a scientific review group on an annual basis, semiannual, quarterly, whatever would be appropriate, to look at what the operating criteria is on any given time?

Mr. DOZIER. We have a pretty good review group at the moment called seven basin States and power customers.

Mr. REID. But that's a political situation, that's not a scientific group.

Mr. DOZIER. All of those people have learned engineers and scientists on their staff.

Mr. REID. Learned, trying to justify their own position. I'm talking about independent people to come in here and look at what's being done. We have a National Science Foundation. We have other scientific groups that whose job it is to give an independent view of different things that are going on.

I'm not certain how they would fit into this. I'm not impressed with the fact that the seven basin States have their own scientists, because their own scientists are trying to squeeze all the water out of this poor little river that they can.

Mr. DOZIER. An independent review group could certainly provide some good insight and I think with the modeling capabilities we have we would be able to provide them information and let them review about whatever option they want to.

Mr. REID. Pardon the interruption, it would seem to me such a review would take a lot of heat off the Bureau also because the Bureau—boy, if I have learned one thing, I have learned that the Commissioner of the Bureau of Reclamation has to be able to be an acrobat, you know, not only be able to do the bar room-type dancing, but do everything. He's got a lot of people to try to satisfy, all of them. And I again repeat, with very selfish motives in mind, with their individual districts. It would seem to me legislatively that if an independent scientific review group were established with a little bit of authority, it would give the Bureau of Reclamation a much easier road to travel.

Mr. DOZIER. One of the concerns I would have is they should not interfere with the daily operations if changes occurred as they did this June. The decisions had to be made and had to be done right then and there wasn't time to have a committee review.

Mr. REID. It is something I think we have to look at. I don't see this scientific group coming in and second-guessing the Bureau's administrative choices. What I do see is long-range planning.

For example, the proposal the Commissioner gave to seven basin States yesterday, and outlined briefly for us today, would seem to me that it would give a lot of additional clout to that proposal if he said, you know, we have gone over this with the scientific review panel that has been established by act of Congress, or whoever established it, and they back us up on this.

Now these are people, Professor James from Georgia—not from Utah—people that would have no axe to grind, so to speak.

Now I'd like to hear from you, Professor James, and you, Dr. Paulson, in this regard, whether you think something like that is feasible. Maybe it isn't.

Mr. JAMES. I certainly support the idea of an independent review panel. I don't mean to imply that I suggest it would be any kind of day-to-day interference, would be maybe an annual or periodic review of basic operation policy in terms of how to improve operation effectiveness in the future given conditions as we know at that particular time and then would leave it to the Bureau to do all the day-to-day things, perhaps in the next year reviewing how it came out but certainly not interfering as the operations went on.

Mr. PAULSON. I second everything Doug said. In addition I think it's important to bear in mind a number of people have suggested, of course, that the Colorado River system is governed on the basis of political and legal aspects only and that may well be the case so the scientific information is extremely important when you stop and figure that the physics and chemistry of that river and the impact on our uses, the salinity and high water and so on, and I think the technical community can provide a tremendous service to the Bureau of Reclamation and other agencies in helping to develop rational long-term management program.

I think it's a great idea.

Mr. REID. Congressman Nielson.

Mr. NIELSON. Dr. Paulson, you would increase the capacity of Lake Mead to 4¾ million acre-feet and also the same at Glen Canyon Dam. I have noticed you did not say anything about increase in storage capacity in dams in between there, in Parker Dam and so on. Should they not also be increased a little bit as further checks along the way?

Mr. PAULSON. Now, Parker is downstream of Hoover. I, certainly, in the testimony that I presented in Needles, would have no particular objection to allowing for credible storage space in, for example, Flaming Gorge or reservoirs on the Gunnison to credit against Lake Powell.

I don't have any problem with that, no.

Mr. NIELSON. So not confining this to these two?

Mr. PAULSON. For simulation I did because if you don't do that you have to keep track of all these reservoirs in the simulations and that takes an enormous amount of computer time which the Bureau can do which I hope they take the plan and run it through.

Mr. NIELSON. Mr. Dozier indicated your model doesn't work in his computer or doesn't seem to fit. Do you have any comment on that? Haven't made a rebuttal to that yet?

Mr. PAULSON. Like I said, the backup scientific data are presented in the testimony and what I encouraged the Bureau to do is run that through the computer system and I would be happy to get back together with them. As far as I'm concerned the information is a documented, logical, rational plan and so don't see the problem.

Mr. NIELSON. Let me ask Mr. Dozier a question, don't want to pick on the Bureau of Reclamation, but both you and Commissioner Broadbent said this problem really started in May and June. Are you aware they had a ground water problem in the State of Utah in early as March and April this year, mud slides in early May? Obviously by early May too much snow had fallen there and Utah Lake was over by 4 feet, over the compromised level, and Jordan River was overflowing its banks. All this occurred well before the end of May and June that you and Commissioner Broadbent are talking about.

Couldn't there have been some earlier insight in May or June? I don't think it's fair to say you didn't know until June.

Mr. DOZIER. I'm well aware that was occurring on the western side of the Wasatch front. That area doesn't happen to drain into the Colorado River.

Mr. NIELSON. No, it does not; however, snow which goes this direction also goes the other direction.

Mr. DOZIER. I think the Weather Service can show you and the Soil Conservation Service can show you the Snotel and snowpack that was existing in both basins, say, on April 15 and you'll see there was a significant difference.

Mr. NIELSON. Only have snow on the east side, not on the west side?

Mr. DOZIER. We had more snow on the west side than east side. We had above normal on west side, but had about normal or little below in some places on the east side.

Mr. NIELSON. I guess I just don't believe you.

Mr. DOZIER. I am just going by the data that was collected.

Mr. NIELSON. The reason I say that, I don't mean to be impertinent, but ground water problem was so obvious in my area. My district had Sand Pitch River overflowing, severe river flooding. We had Utah Lake under water 4 feet above what it's ever been before. Obviously we had a water problem well before May or June, and yet nothing was done about Deer Creek Reservoir to lower the area there, and very little was apparently done in Glen Canyon Dam as I indicated.

I am wondering if we didn't act a little too slowly in view of what was obvious to everybody.

Mr. DOZIER. As we have talked about we collected scientific data. We use the facts. Dr. Paulson's model has used historic data. I think if you will spend the time to look at the historic data, actual measurements that were taken, you will find that it was different in the Colorado River Basin than it was on the western side of the Wasatch front just as it was different in Utah this summer than it was when they were having a drought in the midwest.

Mr. NIELSON. The other question I had, Mr. James, you're with the Water Research Laboratory. What do you emphasize at the Water Research Laboratory? I knew the process when Dr. Bagley was there. What have you done in salinity and other things relative to the Colorado River, setting the salinity of the water and silt concentration?

What have you been doing in those areas?

Mr. JAMES. We have a number of studies that are continuing in salt loading, the processes through which irrigation of water collects salt as it passes through the ground and I guess into the river and how the irrigation practices affect the passthrough which the water flows, and the salt that's picked up.

We have also been doing, particularly in the year we have just been having in Utah, a number of studies related to mud slides and mud flows and predicting hazard in the areas downhill from those flows.

Mr. NIELSON. Have either you or Dr. Paulson listened to the aqua train proposal to take care of the salinity problem to transporting the water along with liquid carbon dioxide?

Are you familiar with that particular proposal? Is it a pipe dream or have some real merit?

Mr. JAMES. I'm familiar with it. I haven't done any studies on it so I guess as a scientist I don't want to comment on its merit at this point.

Mr. PAULSON. I have heard of it as well and primarily from the standpoint it's supposed to go through our Las Vegas Wash area down here which is a controversial spot to start with. As Dr. James indicated I have not seen the scientific information or anything on it but look forward to.

Mr. NIELSON. The argument is it will take care of the salinity problem.

Mr. PAULSON. I don't think it will take care of the salinity problem.

Mr. NIELSON. That is what is being argued.

Mr. PAULSON. We have numerous salinity sources in the Colorado River system that are derived from natural and irrigation waters and things of that nature. I don't think it's a catchall solution to salinity.

Mr. JAMES. It could potentially be useful, but I won't say it will take care of the problem.

Mr. NIELSON. We'd like to recommend the water research and comparable facilities at Nevada-Las Vegas, take a look at that proposal and see if it would in fact help the problem at the Colorado River concerning salinity. I think it's very important. The only question, as I say, I was probably a little rough with you, Mr. Dozier——

Mr. DOZIER. I'm used to it by now.

Mr. NIELSON. When you have a mud slide that builds a dam in 2 days and drowns a town and this sort of thing, then you tell me you don't know anything until May or early June, it just doesn't wash.

Mr. DOZIER. I think we started in about mid-April.

Mr. NIELSON. No, you said late May or June.

Mr. DOZIER. Late May is when the temperature turned around drastically.

Mr. NIELSON. That's all the questioning I have.

Mr. REID. Mr. Dozier, would you run this program that Dr. Paulson suggested in your computer—he has no capacity to do it himself—and supply us the results?

Mr. DOZIER. I certainly would.

Mr. REID. I appreciate that very much.

Thank you so much for your testimony.

Next panel we'd ask to come forward is a panel of meteorologists and forecasting hydrologists: Dr. Paul Bock from the National Advisory Committee on Oceans and Atmosphere, and Warren Patefield, director of the National Association of Conservation Districts from Laurel, Nebr.

May we first hear from Dr. Paul Bock?

Dr. Bock, some of us have seen your résumé, but for those in the audience and news people, it would be appreciated if you would tell us your background.

STATEMENTS OF PAUL BOCK, NATIONAL ADVISORY COMMITTEE ON OCEANS AND ATMOSPHERE AND WARREN PATEFIELD, DIRECTOR, OF THE NATIONAL ASSOCIATION OF CONSERVATION DISTRICTS, LAUREL, NEBR.

Dr. BOCK. Good morning, Mr. Chairman and committee. My name is Paul Bock. I am a member of the National Advisory Committee of Oceans and Atmosphere.

Also, I am professor of hydrology and water resources at the University of Connecticut, Storrs, Conn., and I have been asked by Dr. John Knauss, the NACOA Chairman, to testify on behalf of the committee.

I had the privilege of being chairman of NACOA panel which produced this report, "The Nation's River and Flood Forecasting and Warning Service," which was just issued in March before the flooding events.

Mr. REID. We would ask that be made part of the record, and hearing no objection, it will be made part of the record.

Dr. BOCK. Thank you.

Mr. REID. We have had the opportunity to read your written testimony. In the interest of being able to ask you some questions, would you be kind enough to summarize your testimony. We will make your complete statement part of the record?

Dr. BOCK. Thank you.

The NACOA community looked at the national picture, not at any individual region of the country. So we are giving an overall picture of essentially the National Weather Service's flood forecasting capabilities, and we have made six recommendations, some of which perhaps are fairly pertinent to this meeting today.

We looked at the overall dimensions, magnitude of the national flood problem. We found that in terms of average annual damage there is something like $2 billion average annual damage over the country, located in all parts of the country. About 185 to 200 fatalities a year occur, on the average.

Mr. REID. You said up to 200 fatalities?

Dr. BOCK. Yes, or more, and this is going upward, I believe, at 5 percent a year. Something like one-sixth of all the urban areas in the country are in flood prone areas. Something like 75 million urban dwellers live in flood prone areas.

The flooding problem in the United States is the single greatest natural disaster that the Nation faces. FEMA, Federal Emergency Management Agency, uses something like 85 percent of its budget for flood-related disasters. Something like 85 percent of all Presidentially declared national disasters are flood related.

Mr. REID. What was that percent?

Dr. BOCK. About 85 percent in the last 5 years of all Presidentially declared national emergencies are flood related so that we are talking not about a problem only exclusively in the Colorado but in Illinois and Utah and the Susquehanna River and elsewhere.

Now, arrayed against this natural problem, the main line of warning we have found is the National Weather Service and its subarm, the Office of Hydrology.

The Office of Hydrology is within the National Weather Service. The National Weather Service is the agency that is mandated to provide the official flood forecasts to the public.

Now the dimensions of the National Weather Service hydrology can be measured by its budget; $15 million a year is what is allocated overall for the country as a whole.

Something like 165 professional hydrologists in the National Weather Service forecast floods and river flows, 165 scattered among 13 river forecast centers and in Washington, D.C.

The river forecast center here at Salt Lake City for the Colorado River consists of five—I'm told five professional hydrologists. Five professional hydrologists are the front line for forecasting officially the floods on the mighty Colorado River.

Mr. Chairman, we also looked at various aspects of the flood forecasting problem including local and cooperative arrangements between the National Weather Service on the one hand and the local community on the other hand.

We find these cooperative arrangements very cost effective and very useful.

Mr. Chairman, as I said, there were about five or six recommendations. I should go over them very briefly. NACOA recommends essentially to upgrade these cooperative community self-help programs called ALERT, an acronym for automatic local evaluation in real time, an integrated flood warning system.

We feel that these offer considerable promise for better enhanced local flood warning systems.

Mr. REID. Elaborate on that just a little bit. Is it that volunteer citizens observe, basically; is that right?

Dr. BOCK. Yes; essentially the community provides the finances for the hardware, the telemetry, precipitation, and perhaps snow gages, and the microcomputers. The National Weather Service hydrologists provide the hydrologic expertise.

Mr. REID. Someone else analyzes what someone else gathers?

Dr. Bock. Yes; the National Weather Service provides that competence and this is again for forecasting to the local communities. Local communities then use the local real time data to make forecasts.

We also found that the National Weather Service hydrologic forecasting is dependent not only upon its own services, but also upon the weather services of the National Weather Service, its parent organization.

Also flood forecasting is dependent upon other Federal agencies such as Department of Interior's Geologic Survey, Bureau of Reclamation, Soil Conservation Service, U.S. Geologic Survey, and so forth.

These are all interdependent and we find that the gages that are supported, operated and maintained by these other agencies are essential, many times, for the operation and observation of the network for hydrologic forecasting services.

There are also some institutional or administrative recommendations we made concerning, for example, the OMB, Office of Management and Budget, providing appropriate guidelines and criteria for planning and the operation of a flood forecasting warning system.

We feel that a clear statement at the statutory level would be useful.

The NACOA community also recommended that certain institutional mechanisms and cooperative arrangements be looked at for using the hydrologic expertise in other agencies such as the TVA and Bonneville Power Authority during critical flood situations.

Mr. Chairman, there are also a number of technical improvements that we recommended. One concerns the improvement of the numerical models for flood prediction, including the calibration of models.

The other recommendation we made was to install automatic recording rain gages and other hydrologic gages in data sparse areas where they are needed.

At present the backbone of precipitation observations for flood or forecasting is cooperative volunteers who do this essentially on a daily basis. Many times this daily basis is not enough.

Many times they are not there on Saturdays or Sundays or holidays. What you need is somebody dependable and in real time.

Finally, Mr. Chairman, NACOA recommended a novel, perhaps, concept which suggests that FEMA, the Federal Emergency Management Agency, in cooperation with NOAA undertake a comprehensive study to essentially look into the feasibility of adjusting the national flood insurance program insurance schedules to reflect the degree of capability of flood forecasting services that an increased flood forecasting service, an enhanced flood forecasting services would provide.

Comprehensive flood forecasting services can reduce flood damage and these savings could be passed on in terms of supporting better cooperative flood forecasting arrangements with the National Weather Service and, therefore, this would be a savings to the U.S. Government.

Mr. Reid. As it relates to flood insurance——

Dr. Bock. As this relates to flood insurance; yes.

Mr. Chairman, this concludes my testimony.

Mr. REID. Thank you very much, we appreciate it.

I'm sure we both have questions but that was very detailed, to the point, and very good.

[The prepared statement of Dr. Paul Bock follows:]

A Special Report to
the President and
the Congress

The Nation's River and Flood Forecasting and Warning Service

National
Advisory
Committee on
Oceans and
Atmosphere

March 1983
Washington, D.C.

NATIONAL ADVISORY COMMITTEE
ON
OCEANS AND ATMOSPHERE
3300 Whitehaven Street, N.W
Washington, DC 20235

March 8, 1983

To the President and Members of Congress:

I have the honor to submit to you this special report, "The Nation's River and Flood Forecasting and Warning Service," prepared by the National Advisory Committee on Oceans and Atmosphere (NACOA).

The importance of an effective flood forecasting service cannot be overemphasized. Floods are the largest single cause of natural disasters in the United States. As you are aware, the recent floods in the southeastern United States and the floods in California and the Mississippi River Valley earlier this year caused hundreds of millions of dollars in damages. In our view, the Federal Government's present flood forecasting and warning system can be improved to alleviate some of the hardships caused by floods.

The report examines the flood services provided by the Department of Commerce through its National Oceanic and Atmospheric Administration. It contains our recommendations for enhanced public safety and reduction of losses through improvements to the services, including a recommendation for expanding critical volunteer citizen participation. The Committee hopes that our effort will assist you in providing the flood forecast and warning systems needed by our citizens.

Respectfully,

John A. Knauss

John A. Knauss
Chairman

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EXECUTIVE SUMMARY

During the single month of December 1982, flood losses along the Mississippi River Valley were estimated to reach the $1 billion mark. The States of Illinois, Missouri, Arkansas, and Louisiana bore the brunt of the floods. Flash floods and other types of floods occur at any time of the year practically everywhere in the United States. Floods in Connecticut in June 1982 caused estimated damages of over $275 million and 12 deaths.

Floods have a tremendous impact on our Nation's economy and on the safety and well-being of its citizens, causing average annual damages of nearly $2 billion and an average of 185 fatalities yearly. Flood damages have approached $4 billion twice in the past 12 years. But far more losses would occur, were it not for the river and flood forecasts and warnings provided by the Federal Government.

The National Advisory Committee on Oceans and Atmosphere (NACOA) believes improvements can be made in the Nation's river and flood forecasting and warning system that would increase the effectiveness of the service and reduce loss of life and property. The technology is available. We believe it is a worthwhile, cost-effective undertaking. According to some estimates, a 10-percent reduction in property damage is possible—this could save our economy $200 to $400 million annually.

The central core of the Nation's complex system of river and flood forecasting is the National Oceanic and Atmospheric Administration (NOAA) and its National Weather Service (NWS). NOAA is responsible for issuing river and flood forecasts and warnings to the public. The marginal cost of this program to NOAA is about $15 million per year.

The focus of this report is the NWS river and flood forecasting and warning service. We examine the changing requirements for services, especially the greater demands exerted by a growing population and urban developments in flood plains. We examine the dependence of the NWS river and flood forecasting on the weather systems and operations of NWS and on the facilities and information gathered by other Federal agencies, such as the U.S. Geological Survey, U.S. Army Corps of Engineers, and the Soil Conservation Service, in support of their respective mission needs. We see the need for an improved coordinating mechanism to ensure that this complex information network is as effective as possible under independently changing needs and resources of the agencies involved.

We believe there is a need to augment the rain guage data collection network, which consists largely of volunteer observers, by recruiting more volunteers and by installing automated rain gauges in sparsely populated areas and in areas where data reporting rates higher than now provided are critical for flood forecasting. We estimate that the addition of automated rain gauges for the present network would cost about $15 million. Improvements also could be made in the volunteer observer reporting system by providing each observer with "Touch-Tone" telephones and thus, in a sense, "semi-automating" local reporting. These improvements would cost about $150,000 annually.

We are impressed by the local community flood warning systems that have been implemented at more than 650 communities. And, we urge the expansion of these programs that are funded by the communities which benefit from these customized local flood warnings.

Finally, we highlight a new concept we believe can improve local flood forecasting and warnings. In our examination of the history and structure of the National Flood Insurance Program (NFIP), we find no relationship between the NFIP insurance premiums and the availability, absence, or effectiveness of a flood forecasting and warning service for a specific community. It is our view that effective flood-related services, especially flood forecasting, would reduce losses, and thereby the cost of insurance. A community could use some of the accrued savings to institute the needed local flood warning system. The rest of the savings could be used to reduce flood insurance premiums. We believe, therefore, that there is merit in coupling flood insurance rates with the degree of flood forecasting and warning service and community preparedness programs.

INTRODUCTION

There were four major floods[1] in the United States in 1982. According to the National Oceanic and Atmospheric Administration (NOAA), these floods collectively claimed 150 lives and caused damage in excess of $2 billion. Fort Wayne, Indiana had its worst floods since 1913 as a result of spring snowmelt in March. New England suffered its worst flooding in 22 years, particularly in Connecticut where at least 12 people died. An unseasonal December storm struck the central Mississippi Valley causing massive flooding and nearly $1 billion in damage.

The potential average annual property damages from floods in the United States was estimated at $3.9 billion in 1975 (Water Resources Council, 1977)[2]. On the average, more than 300,000 people are evacuated from their homes or places of work annually, and about 185 lives are lost annually due to floods. One-sixth of all urban areas are in flood-prone areas; over 200,000 square miles in our Nation are subject to flooding.

Floods affect our economy. Agriculture, trucking, building, tourism, recreation, manufacturing, utilities and power generation, and other sectors of the economy are directly affected by flood conditions.

Floods have occurred over flood plains[3] for millions of years. The contest between man and flood over the use of this land has continued throughout this history. But "to be forewarned is to be forearmed"—to know *a priori* the likelihood of a flood enables man to take the measures necessary to avoid or mitigate the damages caused by the flood. The river and flood forecasts provided by the hydrologists of the present day forecasting service have antecedents dating back to the ancient Egyptians.

We recognize that land use practices and policies have had considerable impact on the exposure of our citizens to damaging floods through loss of property and loss of life. River channels were the primary means for travel and commerce in the early days of our country. Canals, roads, and railroads followed these river channels along which cities were founded. Many of our early settlements and cities, and much of our Nation's development since then, have occurred in areas we now identify as flood prone.

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[1] In this report, a "flood" means a temporary condition of partial or complete inundation of a normally dry land area from the overflowing of the banks of rivers, tributaries, or of tidal waters, or from the unusual and rapid accumulation or runoff of surface waters from events, such as unusually heavy rain, ice-jam breakup, earthquake, or dam failure.

[2] The Water Resources Council (WRC) estimate made for 1975 was $2,243 million, given in 1967 dollars. This is the equivalent to about $3.9 billion 1975 dollars when adjusted by the Producer's Price Index. The losses reported by NOAA from 1972 to 1979 averaged $1.7 billion, with a high of $4.0 billion in 1979 (Bureau of the Census, 1981).

[3] An area that has or may be covered by floodwaters is a flood plain area. These are usually identified as those areas that could expect to be inundated by a 100-year frequency flood, a flood with only a 1-percent chance of being equaled or exceeded in any given year.

This NACOA report reviews the Nation's flood forecasting and warning system which has, because of land use and development, become of considerable importance for public safety and property salvage. Specifically, we focus on the extent and adequacy of the services provided by NOAA. Through the hydrologic services program of its National Weather Service (NWS), NOAA is the Federal agency responsible for river and flood forecasting and warning services to the public.

It is important to keep in mind throughout this report that NOAA's hydrologic services are organizationally and functionally an integral part of the NWS weather forecasting system. All of the routine operations NWS requires for its weather services, such as the NWS radars, satellites, weather analyses

1983 Floods in Southern Louisiana.

CREDIT: Photo by Larry Ciko, ***The Times-Picayune/The States Item.***

and forecasting, etc., are essential and are available to its hydrologic services. NWS advancements in new technologies for observations, computers, and communications affect the hydrologic services in the same manner as they affect weather services—improved service effectiveness.

A NACOA review completed in July 1982 examined the Nation's weather services. In that report, "The Future of the Nation's Weather Services," NACOA sets forth a series of findings and recommendations of direct relevance to weather services efficiency and effectiveness, which also are of direct relevance to the efficiency and effectiveness of NOAA's flood forecasting and warning services. The summary of our findings and recommendations from that report is given in Appendix A. It is our view that a modern National Weather Service able to detect, analyze, and predict weather phenomena at all time and space scales is essential for effective flood predictions and warnings.

Our earlier statement that NOAA's hydrologic services depend significantly on NWS weather service technology is not meant to imply that flood forecasting and warning services do not have technology requirements beyond those available from NWS base systems. There are several areas where new technology specifically directed to hydrologic service applications is important. Among these are efficient automated guages and stations that can relay their information through satellite platforms, interactive graphic display systems to improve the effectiveness of flood forecasts and warnings, and interface terminals to access non-NWS data and information sources.

The present national weather system is a complex mix of interdependent public and private services that has evolved over the years to provide the United States with effective weather services for the protection of the public and for its safety and welfare. This kind of mix serves the public interest well. We believe the Nation's hydrologic services are similarly a complex mix of interdependent public and private services that has served the country well. The central role in flood forecasting and warning is that of NOAA through the NWS hydrologic services program, a role fortified by the critical dependence of that service on all NWS weather service related operations.

NOAA performance also depends on important information provided by the U.S. Geological Survey (USGS), the U.S. Army Corps of Engineers (COE), the Soil Conservation Service (SCS), and others—information developed routinely as part of broad water resource responsibilities yet crucial to flood forecasts and warnings. The private communications media are the primary disseminators of the NWS river and flood forecasts and warnings. And, there are private and other industries using observational data and forecast products routinely provided to the public by NWS.

With respect to staffing and funding problems, we cite the following work of a select committee convened by the National Academy of Sciences (NAS, 1980) which analyzed the NWS budget and personnel history from 1967 to 1979:

> ... The expansion of services under severe budgetary restrictions was in part due to a strong effort to automate, to reduce the need for increasing the staff whenever possible by using computers and computer driven communications and graphics. The Committee notes, however, that the understaffing, particularly by professional meteorologists and hydrologists, cannot continue without seriously compromising the value of the weather and hydrologic information to the users.

We concur with this view in our examination of river and flood forecasting services.

Other issues addressed in this report include the coverage of the observational network, the local community flood warning systems, deficiencies in the present system, technological improvements, and the flood insurance program.

We also introduce a concept that relates the benefits of flood forecasting and warning services to certain aspects of the National Flood Insurance Program. While we recognize that this federally subsidized flood insurance program involves a complicated set of problems concerning social, economic, and political aspects, we also believe there is considerable merit in examining the relationships between the costs of insurance and the level of flood forecasting service available to specific flood-prone communities.

Finally, having outlined the areas of the Nation's flood forecasting and warning service addressed in this report, we should note several areas we did not address. This should not be taken as indicating low priority areas, but rather, a lack of adequate time, coupled with our specific focus on NOAA's river and flood forecasting and warning services, narrowed our examination to its present scope. First, we do not address water resources management even though NOAA's hydrologic services are part of the Nation's total water resources management effort, and that overall this effort involves important work conducted by many agencies which provide critical flood-related information. Similarly, we did not review the land-use policies and programs that may have created some of the flood problems affecting the public today. Third, storm surge forecasts resulting from hurricanes are not included, since such forecasts are provided by NWS meteorologists. NWS hydrologists, however, do work closely with the analysts of such phenomena and use the products of storm surge forecasts in their estimates of river flood stages in estuarine areas. Nor did we address the forecasts for dam failures or breaks although NWS hydrologists do provide dam break flood potential analyses using computer models developed within the NWS Hydrology Research Laboratory. The warnings of floods that may result from dam breaks, however, are the responsibility of NWS.

Other areas not addressed but which we believe are essential to the future progress and effectiveness of the NWS hydrologic services are: (1) basic research performed at universities and research centers; (2) the education and training of hydrologists; and (3) the general community flood preparedness programs that are under the aegis of several agencies. NACOA clearly recognizes, however, that sound community action must work hand-in-hand with NOAA's river and flood forecasting and warning services if maximum effectiveness from the overall effort is to be achieved.

CHAPTER 1

The Importance of an Effective River and Flood Forecasting Service

Flood Damages

Even as this report was being prepared, a disastrous series of floods were occurring in the Mississippi River and its tributaries in December 1982 and into January 1983. Early newspaper accounts (December 9, 1982) had reported damage estimates of over $500 million with at least 36,000 persons forced to evacuate their homes in Illinois, Arkansas, and Missouri. Over 8 million acres of land were under water at the peak of the floods. More recent estimates indicate damages of nearly $1 billion.

According to the Federal Emergency Management Agency (FEMA), during the five years ending in September 1981, the President declared 106 major disasters areas as a result of flooding. These disasters exceeded more than $1 billion in eligible outlays for the recovery, repair, and replacement of facilities and for the assistance of individuals (Holmes, 1981). The resulting expenditures amounted to nearly 85 percent of the FEMA budget for these 5 years—making floods the most significant natural disaster.

Floods are common in the United States, as illustrated in Table 1, which lists the major severe floods that occurred only during the months of May, June,

Table 1.—Examples of Recent Floods for May-August, 1982

Date	*Place*	*Damage Estimates*	*Fatalities*
August 23	McDonald Island, California	$3.3 million	none
August 23	Clark County, Nevada	*	2
August 16-17	Southeast Tennessee, Northwest Georgia	*	5
August 12-13	Kansas City, Missouri	"Extensive"	2
August 11	Wagon Hound Canyon, Utah	$100,000	none
August 8-9	Allentown, Pennsylvania	$4 million	1
July 29	Yerington, Nevada	$1.5-2 million	none
July 15	Law Lake, Colorado	$21 million	2
June 25	Oberlin, Kansas	*	2
June 15	Mills County, Iowa	*	1
June 4-6	Connecticut	$277 million	12
June 4-5	Rhode Island	3.3 million	3
May 25	Southeast Kansas	*	2
May 14-17	North Central Oklahoma, Central Texas	*	5

* No estimate available.

SOURCE: National Weather Service, 1982, Natonal Oceanic and Atmospheric Administration.

July, and August. Damage estimates shown represent local estimates reported only a day or so following the flooding. Although estimates for several areas are not available, those shown total over $310 million in damages with 40 fatalities. The Connecticut floods in June 1982 alone account for most of the damage costs and most of the fatalities.

The magnitude of the flooding problem extends beyond even this listing. The wide-spread flooding disasters caused by single events, such as Tropical Storm Agnes in 1972 and Hurricane Camille in 1969, which amounted to billions of dollars in damages, can overshadow significantly the damage impact of even a series of major floods as shown in Table 1. At the other end of the damage scale, a series of relatively smaller flooding situations can cause significant cumulative damages and public safety problems. For example, in May 1982 the Tulsa River Forecast Center (RFC) issued over 1,000 flood forecasts in Oklahoma and Texas for more than 65 communities that experienced flood property damage of over $10 million.

Flood Damage from Tropical Storm Agnes, U.S. Route 1 at Elkridge, Maryland (Patapsco River).

CREDIT: National Guard.

Our point is that flood disasters and the resulting damages and human hardships are not occasional events nor geographically isolated. Moreover, we do not expect by decree or otherwise to eliminate floods that threaten lives and property. These will go on. We do believe, however, that effective flood forecasting combined with effective community preparedness programs can reduce property damage and can save lives.

In 1975, the Water Resources Council (WRC) identified 20,813 flood-prone communities with areal extent of at least 10 acres. Of these, 6,148 were places with populations of 2,500 or more. Figure 1 illustrates the WRC regions; Table 2 lists the number of flood-prone areas in each region.

In its 1977 report on flood damages, the WRC estimated that flood damage in 1975 amounted to about $3.9 billion (see footnote #2 on page 1.) The estimates were provided by the Soil Conservation Service for drainage (upstream) areas of less than 400 square miles and by the U.S. Army Corps of Engineers for downstream areas generally over 400 square miles. Damage areas included urban and agricultural properties as well as damage to utilities, roads, railways, homesteads, forests, grasslands, parks, refuges, etc.

The WRC report also projected damage estimates for the years 1985 and 2000 on the basis of four future alternative situations. The alternatives were (1) the status quo, that flood plain management would remain as it existed when the report was prepared; (2) some increase in regulations; (3) the maximum practical regulation; and (4) a modified program of flood plain regulations

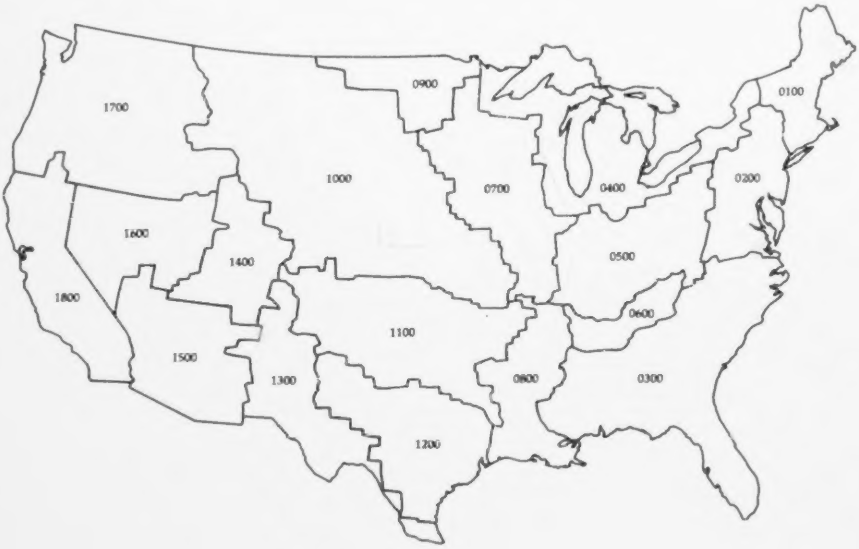


Figure 1.—Water Resources Council Regions of the Continental United States.

SOURCE: Water Resources Council, Washington, D.C.

Table 2.—Communities with a Flood Problem

Geographic Area	Water Resources Council Region	Communities with a Flood Problem	
		All Places	Places of 2,500 or More Population
		—Number—	
New England	0100	1,158	498
Middle Atlantic	0200	3,194	870
South Atlantic Gulf	0300	2,156	721
Great Lakes	0400	1,294	747
Ohio	0500	2,593	658
Tennessee	0600	441	117
Upper Mississippi	0700	1,823	536
Lower Mississippi	0800	809	192
Souris-Red-Rainy	0900	188	19
Missouri	1000	1,221	228
Arkansas-White-Red	1100	734	237
Texas-Gulf	1200	1,099	309
Rio Grande	1300	412	60
Upper Colorado	1400	144	19
Lower Colorado	1500	311	52
Great Basin	1600	213	52
Columbia-North Pacific	1700	1,270	212
California	1800	1,027	487
Alaska	190	325	20
Hawaii	2000	271	34
Caribbean	2100	130	70
United States		20,813	6,138

Source: Water Resources Council, 1977, Washington, D.C.

implemented at a rate faster than the current rate but not up to maximum practical level, and structural measures installed at a slower rate than in the past. The regulations referred to are those included in the Flood Insurance Act of 1968, the Flood Disaster Protection Act of 1977, and the National Disaster Relief Act of 1974, which provide for the adoption and use of legal tools to control flood plains, including zoning, construction requirements, and some tax incentives or subsidies to encourage implementation.

The WRC chose alternative (4), the modified program, as most likely, and projected flood damages for 1985 that would amount to $4.21 billion when adjusted to 1975 dollars. This contrasted to the status quo estimate, alternative (1), of $4.60 billion in 1985, also adjusted to 1975 dollars. The primary reduction in damage was attributed to urban areas, with little change for agriculture.

Recent experience shows that the modified case projected by the WRC in 1977 might be somewhat optimistic. Flood damages in 1979 were about $4 billion.

Flood plain regulations have lagged, and implementation of structural measures has been largely dormant. On the other hand, WRC flood damage review and projections did not consider potential effects from improved flood warning and evacuation programs.

Flood Management Schemes

There are four kinds of national flood management programs. The most traditional type, which takes 10 to 25 years to implement, deals with "structural" management, including dams, dikes, levees, channels, diversions, etc. These are usually earthen or concrete structures built mainly by the U.S. Army Corps of Engineers, Bureau of Reclamation, and the Soil Conservation Service.

A second program has been emphasized in the past two decades. This consists of a variety of "non-structural" elements, such as flood plain management, local zoning, a subsidized National Flood Insurance Program, and upstream land management programs.

A third flood management program consists of a variety of Federal/State community preparedness programs for action before, during, and after flooding. These range from ad hoc actions to comprehensive operationally ready programs involving the Federal Emergency Management Agency, the National Guard, State Police, Red Cross, town engineers and public work forces, local elected officials, etc.

The fourth flood management program is NOAA's River and Flood Forecasting and Warning Service, which employs about 300 people with a budget of about $15 million per year. Essential to this program are the many contributing services and products developed by other offices or agencies for their respective mission requirements. Paramount among these are the weather and precipitation forecast operations of NWS, and the river and water resource information provided by the operations of the U.S. Army Corps of Engineers, the U.S. Geological Survey, and the Soil Conservation Service. Thus, the annual cost of $15 million noted above is the incremental additional cost required by NOAA to operate its NWS river and flood forecasting and warning service and to provide other services, such as water supply forecasts and information useful to river navigation.

These four flood management schemes have different emphases, ranging from managing the flood waters to warning the people. Their objectives are to keep floods away from people, to discourage people from building in flood plains, to promote timely community preparatory action, and to provide adequate flood warnings. The basic elements are:

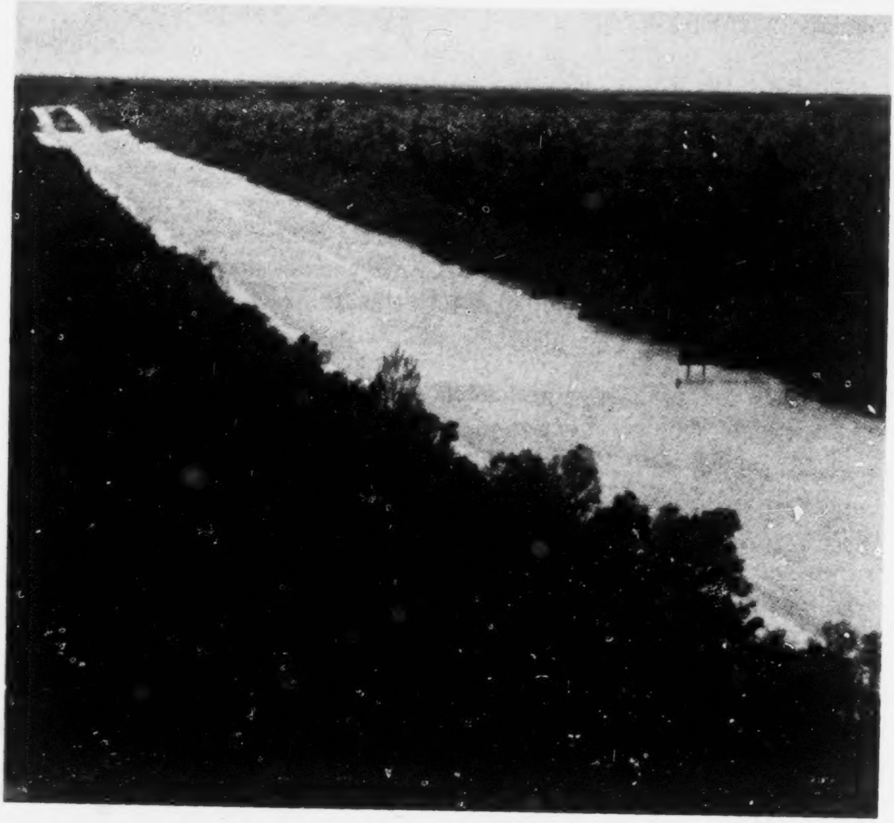
- Flood control reservoir systems to reduce peak flows;
- Levies and dikes to guide and confine the spread of the flood waters;
- Local zoning ordinances to control development in flood plains;
- A subsidized National Flood Insurance Program to provide incentives for flood plain management (this program does not include

incentives for provision of enhanced flood forecasting services nor for community preparedness programs);

- Community preparedness and action programs designed to reduce the flood's effects; and
- A national river and flood forecasting and warning service.

Ideally, all four management schemes should be coordinated and scaled to each individual flood-prone community. However, this has rarely happened, because the components of flood management each relate to other aspects of our overall national water resources policies.

The increasing interest of the Administration over the past few years on the roles of the government and private industry in the provision of a variety of services to the public also may affect how services are provided in the future. This has considerable significance on flood forecasting and hydrologic services, since the Nation's weather services performed by NWS, from which the



Interstate Highway 10, looking west, 1983 Floods in Southern Louisiana.

CREDIT: Photo by Larry Ciko, *The Times-Picayune/The States Item*.

bulk of the products and information necessary for flood forecasting are provided, are among those services under discussion for modification and possible reduction of Federal involvement.

There does not exist an effective Federal mechanism to resolve water policy issues involving national flood management and flood forecasting. The Water Resources Council, an interagency coordinating body that has some responsibilities for these, has not addressed, over the years, many of the complex issues involved, even though in 1975 it did assess flood damages and made projections of future damages. We will discuss this later when we review interagency coordination in Chapter 3.

Changing Requirements for River and Flood Forecasting

The basic structure for the present hydrologic forecasting service of NWS was initiated in 1946, only 37 years ago. The Weather Bureau was established by Congress in 1870. For the Bureau's first 70 years or so, flood forecasting functions were performed by meteorologists who rarely had adequate training in hydrology. In 1946, NWS employed 12 hydrologists and staff for 2 River Forecast Centers (RFCs) at Cincinnati, Ohio, and at Kansas City, Missouri. These NWS hydrologists provided, in addition to the general guidance information on floods and flash floods, specific flood forecasts to a few dozen locations. The NWS hydrologic system was then largely non-automated; volunteer cooperative observers telephoned rainfall and other data to the Weather Bureau offices whenever heavy rains occurred but not more than once per day in most cases. Long delays at the RFCs in receiving and making data entries manually were commonplace, especially during the floods when the data were most important. Hydrologists used simple manual forecasting techniques. Experience and judgment of the hydrologists were key ingredients of the hydrologic forecasting system of the 1940s. The science of meteorology, which provides major supporting tools and analyses critical to flood forecasting, had not attained the present level of sophistication. Even today, with greater automation, better technology, and modern sophisticated hydrologic forecast numerical models, subjective judgments of experienced hydrologists are still important.

There were some advantages to the old system. It was simple, practical, inexpensive, and perceived adequate. Hydrologists of this era provided useful forecasts without significant special training and improved their skills slowly as their knowledge of local hydrology increased and as modest improvements in technology came along. Furthermore, the system was based on relatively simple "river basin models" as contrasted to the modern highly data-dependent "hydrologic systems models" of today. And, most importantly, the various elements of the forecasting system—volunteer observers, a manual data communications and processing system, simple river basin models, state of the art methodology—seemed able to cope with slowly changing societal needs.

However, pervasive changes in the Nation's development, social structure, and economy inexorably forced the NWS hydrology forecasting services to change. From 1950 to 1980, the population of the United States increased by nearly 50 percent, and, more importantly, the percentage of the total population living in urban areas went from 64 percent in 1950 to 73.5 percent in 1980 (Bureau of the Census, 1981). Much of this development, we have heard, occurred in flood-prone areas. At the same time, public attitudes about protection of the environment became more prevalent, forcing the slowdown and, at times, cessation of construction of dams and levees and other "structural" flood management projects.

Such changes in national demographic patterns, national priorities, and the economy have caused incremental hydrologic changes during the past half century. These have overwhelmed the capabilities of the NWS flood forecasting system in many ways. First, the sheer number of flood-prone communities require NWS resources and capabilities far beyond that of the present semi-automated NWS flood warning systems. Second, urbanization and channelization have caused not only higher flood peaks but also floods that peak faster. Much too often, the flash flood arrives on the scene before the present NWS flood warning systems can react. For example, on a typical day, the volunteer weather observers are expected to telephone data into the NWS office at 7:00 a.m., but only after a significant amount (one-half inch) of rainfall has occurred. But, critical flash floods can and do occur between reporting times and between observing stations.

Cost-Benefit Aspects of Flood Forecasting

The incremental cost to NWS to provide hydrologic services was about $15 million in Fiscal Year (FY) 1982. What are the benefits?

Studies of specific flood damage statistics show that adequate flood warnings can and do save lives and reduce property losses. According to one study, an increase in the warning lead time from a few hours to 14 hours for an "18-hour flood event" (a flood on a river in which the crest of the flood at a point occurs 18 hours following a period of excessive rainfall over that portion of the river basin above that point) and an increase in the lead time for flash floods from a half-hour to 2 hours for a 6-hour flood event would save about $100 million per year in personal property, such as automobiles, appliances, and other removable belongings.

Several elements are important to any assessment of the benefits of flood forecasting (Day, 1973). These include the length of warning time, magnitude of reducible damage, efficiency of response to warning, duration of flood, weather conditions, frequency of flooding, and time of occurrence of flood peak. A mathematical model was used in Day's technical study to simulate the benefits of providing flood forecasting in the Susquehanna River Basin for urban private residences only. The study showed that a flood warning system, coupled with a community preparedness and action program, could reduce urban residential flood damage by 20 to 33 percent, assuming a 100-percent response from the community. The study also projected benefits-to-cost ratios averaging 5:1. Greater savings would have probably been realized if the cost of personal automobiles were included in the model. As noted in the study, these results could not be used solely to estimate the total benefits accruing from the river forecast service, because the study did not include benefits accruing to industrial and commercial properties, which are likely to be substantial.

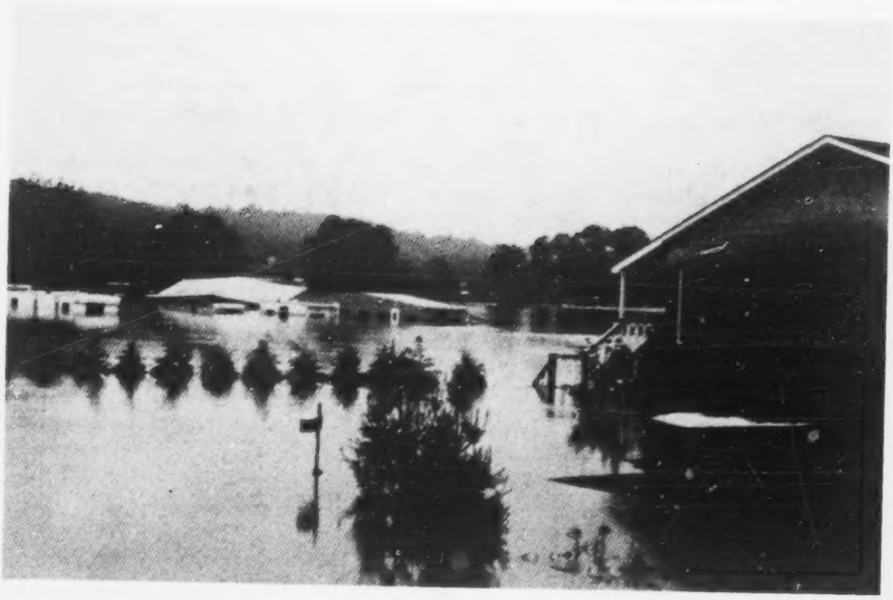
A later study on the flood damage reduction potential of forecast services in the Connecticut River Basin (Day and Lee, 1976) showed a benefit-to-cost ratio of 10:1. This study did include both residential and commercial properties.

A more recent study of the benefits of flood forecasting with advanced warnings uses probabilities of benefits for several scenarios (GKY and Associates, Inc., 1981). The configurations of the rain gauge network and forecast lead times are coupled, and the analyses are made on a River Forecast Center (RFC) basis—one computation for each RFC. The results of this study are thought to be on the conservative side because, among other factors, the damages are calculated only for urban localities of more than 2,500 inhabitants.

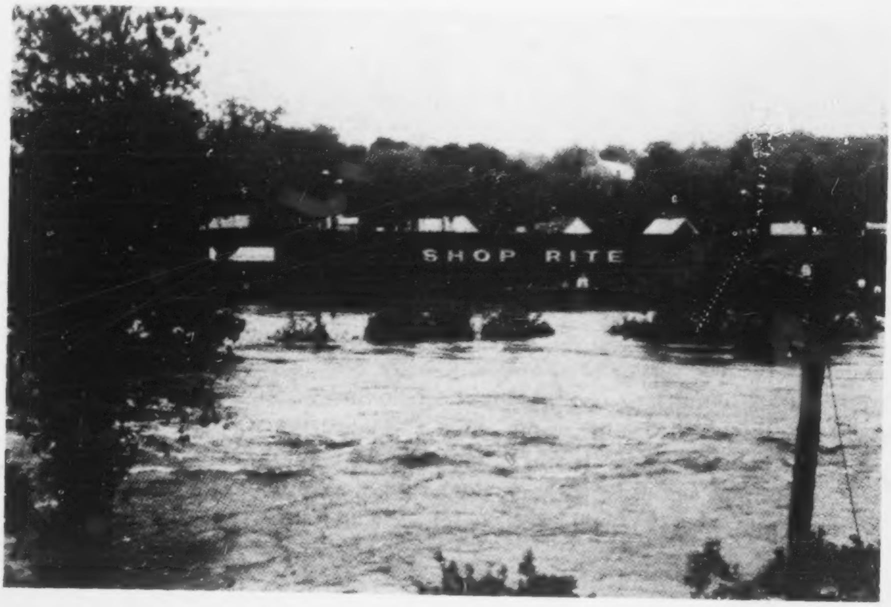
The scenarios used in the GKY study are (1) the status quo, i.e., the systems in existence when the study was being done; (2) computer automation to the RFCs with processing time assumed to drop from 90 minutes to 15 minutes, (3) the availability of "Touch-Tone" telephones for the cooperative observers; (4) the automation of the present observational rain gauge network but with no "Touch-Tone" service for the volunteer observer system; (5) expansion of the cooperative observers network by 50 percent, all with "Touch-Tone" capability; (6) the expansion of cooperative observers network and the automated gauge network; (7) service expansion; and (8) service redeployment. The sum of these estimated benefits above costs calculated for the eight scenarios for 1985 are as follows for all urban sites with a population of over 2,500 people:

Scenario	Benefits Above Costs
(1)	$228.2 million
(2)	$231.7 million
(3)	$234.6 million
(4)	$249.6 million
(5)	$251.3 million
(6)	$260.6 million
(7)	$384.7 million
(8)	$298.0 million

The largest benefits are for scenario (7), which assumes a service expansion by 50 percent in sites provided with a forecast. This case stipulates that (1) all catchments over 2,000 square miles are provided flood forecast services; (2) two-thirds of the catchments between 500 square miles and 2,000 square miles are serviced; (3) headwaters of less than 500 square miles that provide the largest incremental benefits are serviced; and (4) the cooperative observer



Flooding along the Yantic River, Connecticut, June 1982.



CREDIT: State of Connecticut, Department of Environmental Protection, Natural Resources Center.

network is expanded by 50 percent. In addition to the above, automatic gauges would replace cooperative observers in many areas, to the extent that (a) there is an average of three automatic gauges for each headwater, and (b) for every automatic gauge in a headwater area there is one in a downstream area.

Several long-term averages of hydrologic service benefits and costs are shown in Table 3. The highest benefit to cost ratio given is 100:1 for the Pittsburgh River District.

Table 3.—Summary of Hydrologic Service Benefit and Cost Relationships

Estimating Source	**Benefit/Cost Ratio*
Weather Bureau flood damage estimates (1951-1965)	15:1
Congressional report (89th Congress, House Document 35)	17:1
**Pittsburgh River District (1947-1966)	100:1
Meadville, Pennsylvania (50 years of record, 22 floods)	30:1

* Ratio of estimated dollar benefits from hydrologic services to cost of providing hydrologic services.

** Compiled by Pittsburgh Weather Bureau Office for the Upper Ohio River Basin

SOURCE: Environmental Science Services Administration, 1969. A Plan for Improving the National River and Flood Forecast and Warning Service. Office of Hydrology, Silver Spring, Maryland, p.16.

To summarize, floods affect millions of citizens who live in flood-prone places. The average annual flood damage is estimated to be nearly $2 billion dollars, with an average annual loss of life of 185 individuals. These floods occur in a random fashion throughout the year. The importance of proper and effective forecast and warning systems cannot be overemphasized.

The Federal response to flood management has been to build dams and levees, to provide incentives to manage flood plain development, to provide subsidized flood insurance and disaster relief monies, and to provide the Nation with a $15 million NWS river and flood forecasting service staffed by about 300 people of which about 165 are hydrologists. We are aware of no study which has not concluded that the benefits of a flood warning service exceed the cost of providing the flood forecast and warning services. The benefit cost ratios range from better than 2:1 to 100:1; estimates of reduction of flood damages due to flood warning services range from about 10 to 30 percent (Day, 1973). If only a 10-percent reduction in urban damages were realized, it would amount to average annual savings of about $200 million, equivalent to more than 13 times the current NWS budget for hydrologic activities.

CHAPTER 2

The Nation's Hydrologic Services

Federal Role

At least 10 Federal departments, six independent Federal agencies, two offices and a council in the Executive Office of the President, and eight Federal-State commissions are involved in water management activities (Department of Commerce, 1978; National Science Foundation, 1980). Some, such as the quasi-public Tennessee Valley Authority (TVA), carry out related activities for their own enterprises. However, the dominant portion of the national hydrologic services relevant to river and flood forecasting and warnings are provided by four principal agencies.

The U.S. Army Corps of Engineers (COE), through its Civil Works Program covers the entire range of water resource development. Its role involves the planning, design, construction, operation, and maintenance projects for flood protection, navigation, water supply, fish and wildlife enhancement, hydropower, water quality management, and recreation. The Corps' mission also includes general water and related land resources management through planning studies and regulatory functions.

The major part of the hydrologic data required by the Corps are collected by other Federal agencies through reimbursable agreements. About 5,000 stream gauging stations are funded by the Corps, and about one-half of these are operated for the Corps by the U.S. Geological Survey. The Corps and the National Weather Service operate, through cooperative agreements, 39 precipitation networks in dam and reservoir areas. Each agency requires the data obtained from these networks for its own mission needs.

The U.S. Geological Survey (USGS) appraises the quantity, quality, and movement of the Nation's ground and surface water resources. A major USGS hydrologic program is its National Water Data Network which provides for collection of data and the conduct of hydrologic studies in areas of Federal and State interests. In areas of Federal interest, e.g., river basins and aquifiers that transcend State boundaries, and other areas of interstate and international concern, the effort is federally funded. In areas of joint State and Federal interests, the program is funded jointly by USGS and by State agencies on a matching basis. USGS also collects data and performs analyses and studies on a reimbursable basis as may be requested by other Federal agencies.

The data collected by USGS in its National Water Data Network of most significance to NWS river and flood forecasting are streamflow data at about 16,000 stations. Other Network data include lake and reservoir stage, chemical water quality and water temperature, fluvial sediment, and ground water levels.

The Soil Conservation Service (SCS) of the U.S. Department of Agriculture (USDA) plans, designs, and operates small watershed protection structures and provides water supply forecasts for water users in 11 Western States including Alaska. More specifically, the major responsibilities of SCS include:

- Planning upstream flood control measures that may include additional storage for water supply and recreation.
- Planning resource management systems for erosion and water control on non-Federal agricultural lands.
- Data collection of snow and related hydrometeorological data, such as snow water equivalent, total precipitation, and temperature, which the National Weather Service uses for water supply forecasts.

The snow and related hydrometeorological data are collected at 1,600 data collection sites, 500 of which are automated. Prior to 1980, the snow was sampled once a month, January through May, at each of 1,600 sites. However, the automatic snow telemetry system (SNOTEL) provides real-time (current) information once a day.

The National Oceanic and Atmospheric Administration (NOAA), through the hydrologic services program within its National Weather Service (NWS), has the Federal responsibility to provide river and flood forecasts and warning service to the Nation. The official government river and flood forecasts and warnings to the public are issued only by this agency. The NWS hydrologic services program has about 300 employees of whom about 165 are professional hydrologists.

Other types of hydrologic forecasts provided by NOAA include streamflow forecasts used for decisions concerning navigation and for controlling of pollutants and hazardous substances, reservoir operation for hydroelectric power generation, and water supply for irrigation and energy. In addition, its hydrometerological studies are used by other agencies in the planning and designing of dams, highways, and airports, and for flood insurance programs.

Before describing the structure and operations of NOAA's hydrologic service, it is important to keep in mind the role of the other three agencies described—COE, USGS, and SCS. Even though they have no responsibilities for public dissemination of river and flood forecasts and warnings, the data they acquire from systems established for their own purposes and provide to NOAA are of major importance. Without these data, NOAA would be unable to provide an effective flood service.

NOAA's River and Flood Forecasting and Warning System

The "Organic Act" of 1890, as amended (15 USC 313), provided for the transfer of the original Weather Bureau from the Army Signal Service to the Department of Agriculture and thence to the Department of Commerce. As stated in the Act, the Weather Bureau

> . . . shall have charge of the forecasting of the weather, the issue of storm warnings, the display of weather and flood signals for the benefit of agriculture, commerce, and navigation, and the gauging and reporting of rivers . . . .

These responsibilities in river and flood forecasting are now carried out through NOAA's NWS Office of Hydrology and associated components.

NOAA provides service to more than 20,000 flood-prone localities situated in river basins of various sizes. All areas receive general weather forecasts that include the prediction of rain and the issuance of flash flood warnings on a county or zonal basis. Most areas also receive generalized river and flood forecasts for large rivers and tributaries. Site-specific flood forecasts are provided for about 3,000 of these localities.

Figure 2 illustrates the general manner in which the forecast points are distributed in a typical river basin. Following the occurrence of excessive rainfall over the basin, most rivers are capable of producing in their "headwaters" a high crest flood wave from a few minutes to 18 hours after the rainfall. About 1,000 of NOAA's forecast points are located in these "headwaters." These are illustrated by Forecast Point #1 in Figure 2. The Forecast Points labeled #2 and #3 cover regions greater than 1,000 square miles and are located at sites that crest, on the average, more than 12 hours after the rainfall.

In those headwaters areas in which the river crest times are less than 6 hours, NOAA issues flash flood warnings. Headwater flood forecasts are normally issued by the Weather Service Forecast Offices, based on guidance from the RFCs, for streams that crest in 6 to 18 hours. Main stem flood forecasts are issued for floods whose peaks are expected to occur beyond 18 hours. Figure 3 diagrams the relationships between predicted time of flood crest occurrence and various forecasts and warnings.

NOAA Organization

NWS has a central Office of Hydrology, consisting of the Hydrologic Services Division, Water Management Information Division, and the Hydrologic Research Laboratory. The Director of the Office of Hydrology has overall program responsibility for the NWS Hydrologic Service Program and carries out this responsibility through interactions with higher (and lateral) headquarters functions, field components, and through the supporting missions of the divisions and laboratory within the Office of Hydrology. The Hydrologic Services Division works with the field components on day-to-day operational matters. It is responsible for coordinating requirements for new technology and for assisting in implementation and maintenance of equipment and computer systems. The Water Management Information Division carries out hydrometeorological design studies for NOAA and various cooperating water resources agencies. The Hydrologic Research Laboratory is responsible for the research and development in support of field operations.

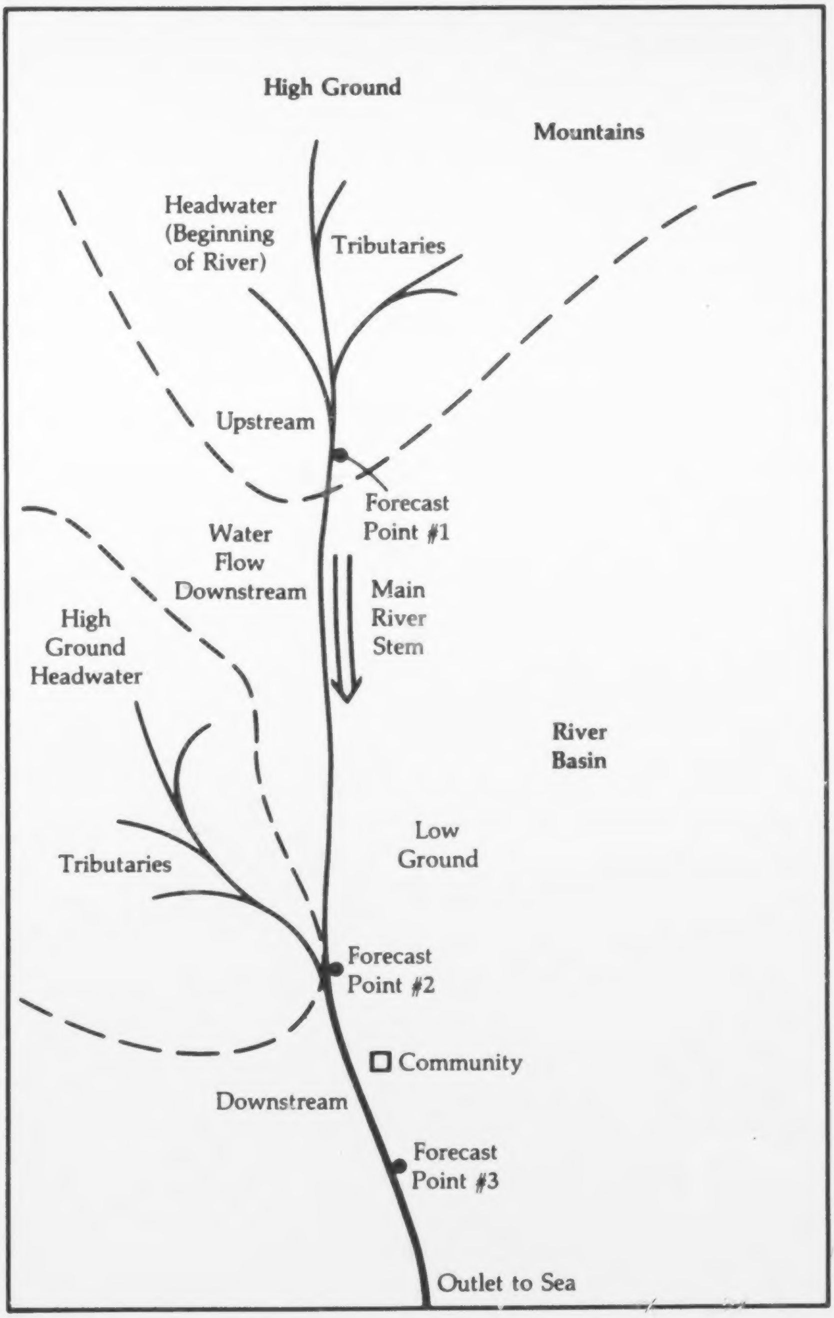

High Ground
Mountains
Headwater (Beginning of River)
Tributaries
Upstream
Forecast Point #1
Water Flow Downstream
Main River Stem
High Ground Headwater
River Basin
Tributaries
Low Ground
Forecast Point #2
Community
Downstream
Forecast Point #3
Outlet to Sea

Figure 2.—Typical River Basin.

SOURCE: National Weather Service, National Oceanic and Atmospheric Administration.

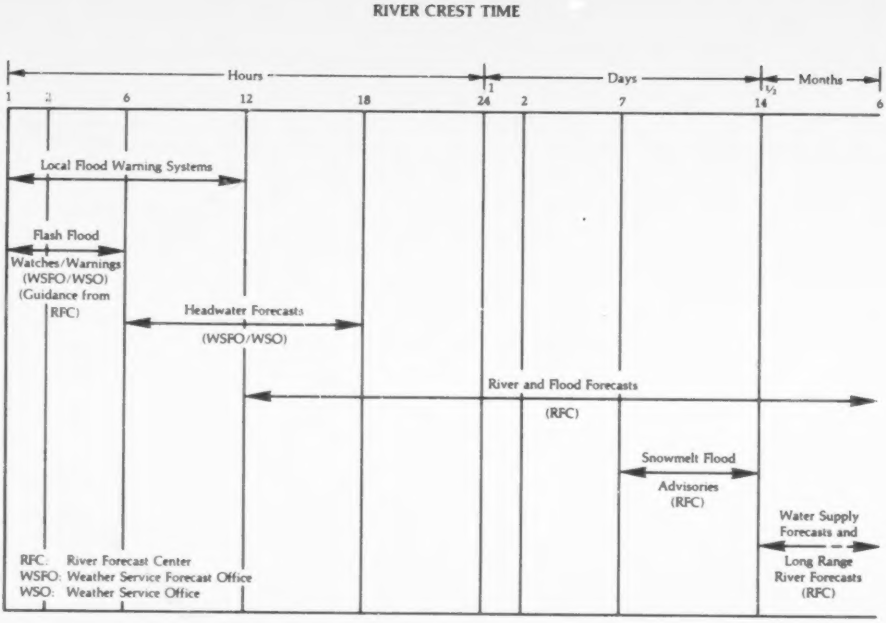

RIVER CREST TIME
Hours
Days
Months
1
2
6
12
18
24
1
2
7
14
½
6
Local Flood Warning Systems
Flash Flood
Watches/Warnings
(WSFO/WSO)
(Guidance from
RFC)
Headwater Forecasts
(WSFO/WSO)
River and Flood Forecasts
(RFC)
Snowmelt Flood
Advisories
(RFC)
Water Supply
Forecasts and
Long Range
River Forecasts
(RFC)
RFC: River Forecast Center
WSFO: Weather Service Forecast Office
WSO: Weather Service Office

Figure 3.—Relationship of Hydrologic Services to River Crest Time.

SOURCE: National Weather Service, National Oceanic and Atmospheric Administration.

The operational hydrologic field program is performed by the NWS Regional Hydrologists, the River Forecast Centers (RFCs), the Weather Service Forecast Offices (WSFOs), and the Weather Service Offices (WSOs). (See Figure 4.) The Regional Hydrologists are responsible for the overall management of the hydrologic service program within their respective regions. The 13 River Forecast Centers are NWS field offices whose primary responsibility is the preparation of hydrologic guidance, site specific river and flood forecasts and advisories, including snowmelt water supply forecasts. The RFC area of responsibility is organized along river basin boundaries as shown in Figure 4; each RFC serves all the WSFOs and WSOs in its region, using hydrologic data provided by WSOs and WSFOs, other agencies, and in some instances, directly by volunteer observers.

RFCs are also responsible for the technical aspects of the hydrology program. They provide assistance to the WSFOs and WSOs, for example, in headwater flood forecast procedures for those river basins that respond quickly to rainfall and where warning times may be extremely short. RFCs also provide technical advice for local flood preparedness planning and water management decisions, and they develop forecast procedures for those communities that have local flood warning systems.

The WSFO operates around the clock primarily with a staff of meteorologists trained in hydrologic program functions. In most instances, a service hydrologist

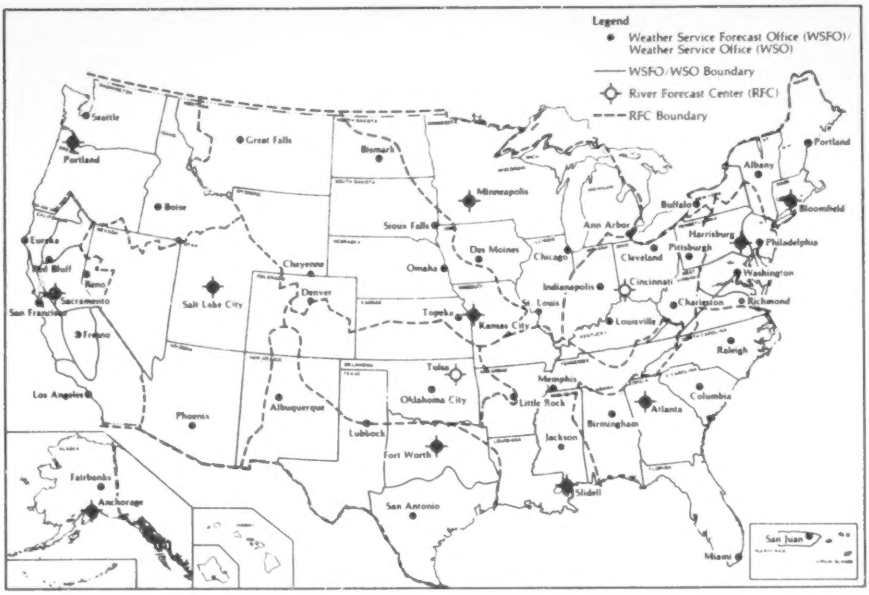

Legend
● Weather Service Forecast Office (WSFO)/ Weather Service Office (WSO)
—— WSFO/WSO Boundary
River Forecast Center (RFC)
- - - RFC Boundary
Seattle
Portland
Great Falls
Bismarck
Boise
Minneapolis
Portland
Albany
Bloomfield
Buffalo
Eureka
Red Bluff
Reno
Sacramento
San Francisco
Fresno
Salt Lake City
Cheyenne
Denver
Sioux Falls
Omaha
Des Moines
Chicago
Ann Arbor
Cleveland
Pittsburgh
Harrisburg
Philadelphia
Washington
Indianapolis
Cincinnati
Charleston
Richmond
St. Louis
Louisville
Topeka
Kansas City
Raleigh
Tulsa
Oklahoma City
Memphis
Little Rock
Columbia
Atlanta
Birmingham
Los Angeles
Phoenix
Albuquerque
Lubbock
Fort Worth
Jackson
Slidell
San Antonio
Miami
San Juan
Fairbanks
Anchorage

Figure 4.—RFC Boundaries and WSFO/WSO Hydrologic Service Areas.

SOURCE: National Weather Service, National Oceanic and Atmospheric Administration.

is also available. Aside from the day-to-day operational hydrology functions, the service hydrologist maintains contact with local community officials, the mass media, and various disaster response agencies, e.g., the American Red Cross and the Federal Emergency Management Agency, as well as other government agencies. Most WSFOs are assigned a Hydrologic Service Area that corresponds to its weather forecast service area. The WSFO is responsible for issuing flash flood warnings, flood warnings, river and flood advisories, daily river forecasts, and other hydrologic products to the public. The WSFO is also responsible for collecting and relaying river and rainfall observations to the River Forecast Centers. It also adapts to local needs the river and flood forecasts provided by the RFC, such as river forecasts for rapidly rising headwaters, and disseminates all hydrologic forecasts, flood and flash flood warnings.

Weather Service Offices (WSOs) are smaller offices with hydrologic function responsibilities. WSOs are responsible for county flash flood warnings. They collect hydrologic data and disseminate river forecasts and flood warnings to the public. Similar to the WSFOs, WSOs also provide an advisory service informing community officials of protective measures that can minimize loss of life and destruction of property caused by floods.

Accurate and timely prediction of heavy rainfall events is extremely important for hydrologic forecasting. Forecast estimates of precipitation for the hydrology program are provided by the NWS National Meteorological Center (NMC). These are reviewed, updated, and modified if necessary by the WSFOs for the RFCs. The National Earth Satellite, Data, and Information Service (NESDIS) of NOAA also contributes to the hydrologic service by supplying NWS field offices with satellite imagery and special analyses of these. Included are estimates of rainfall through Satellite Field Service Centers.

About 9,000 non-Federal dams in the United States have been labeled by the U.S. Army Corps of Engineers as "high-hazard"—with potential for loss of human life and property in damage in the event of failure (COE, 1983). The RFCs provide analyses of the flooding that could result from the failure of dams. These analyses are of considerable value to various Federal, State, and local civil defense agencies for advance plans and preparations for quick action in the event of an actual failure.

As stated before, NWS gives flood warnings for about 3,000 specific points throughout the Nation. Communities located at or near one of these forecast points are provided with site-specific flood forecasting service because of their proximity to the forecast point. However, flood forecasts also are provided through the general warnings of river crests between forecast points to alert communities situated between these points.

Daily forecasts of river stage and discharge are routinely issued by the RFCs at many points along some rivers as an aid to navigation and water management. For many of the 3,000 flood forecast points, daily forecasts of river stage at intervals of 6 to 24 hours are made for forecast periods of 1 to 3 days. Similarly, reservoir inflow forecasts assist the Federal, State, and local agencies in the operation of these reservoirs. Forecasts of ice formation and breakup are prepared for a selected number of locations. Forecasts of seasonal snowmelt runoff are prepared on a monthly basis from January through May in the western United States, and from April through September for Alaska. Forecasts of seasonal snowmelt and runoff are prepared monthly for the northeast United States. Water supply forecasts for 600 points, where snow is the principal source of streamflow, are distributed monthly to local communities by local NWS offices. Other contributions to water management information provided by NWS include lake level forecasts and water temperature forecasts.

Present Cost of the NWS River and Flood Forecasting and Warning Service

The marginal costs to the Nation for the hydrologic services provided by the River Forecast Centers, the service hydrologists at the WSFOs, the Hydrologic Research Laboratory, the headquarters components, and the hydrologic data collection and analysis systems was about $15 million in FY 1982. As we noted earlier, it is a marginal cost, because the weather data acquisition system, e.g., radars, satellites, surface and upper air measuring instruments, and the dissemination and meteorological communications systems that support the NWS hydrologic service are established and operated primarily for NOAA's weather forecasting and warning responsibilities.

Table 4 shows the marginal costs for hydrologic services from 1972 to 1982. Although there have been increases in the budget generally associated with inflation, the budget today is nearly identical to the 1973 budget when inflation is taken into account. Yet, demand for services has been increasing steadily. In view of the increasing impacts of flooding on populated areas, service hydrologists have been added to about 40 of the 50 or so WSFOs during the past decade.

Table 4.—Budget for Hydrologic Service of the National Weather Service

Fiscal Year	*Amount (In Thousands of Dollars)*	*Amount* (In Thousands of 1982 Dollars)*
1982	15,287	15,287
1981	14,406	14,706
1980	14,467	16,353
1979	12,089	15,368
1978	11,126	15,921
1977	10,218	15,760
1976	9,264	15,161
1975	9,028	15,460
1974	8,150	15,246
1973	6,828	15,182
1972	4,916	12,362

* Adjusted to 1982 dollars using the Producer's Price Index.

SOURCE: National Weather Service, 1982, National Oceanic and Atmospheric Administration.

Also, in 1981 a new River Forecast Center in Minneapolis, Minnesota, was opened because of the inadequacy of the service for that area emanating from the Kansas City RFC. During this decade, although some technological improvements have been made (e.g., the installation of small computers at the RFCs), software development and maintenance of these computers has been limited because of the higher priority placed on increasing services within the funding resource allocation.

We do not foresee any lessening of demand for these services. On the contrary, recent floods, such as those in the Mississippi River, indicate to us increased demand, which places even greater stress on the existing hydrologic services.

Local Community Flood Warning Systems

Also contributing, and increasingly important elements of the system, are local flood warning systems. These are cooperative ventures among NWS and State and local governments. Although NWS assists the communities through development of procedures and forecasts for local operations, the systems are operated by the local communities. Thus, they have available an enhanced or "specialized" flood forecasting service beyond that which would normally be available from the NWS system.

The major self-help effort is ALERT, the Automatic Local Evaluation in Real Time system. ALERT began in California and has since been expanded to the States of Arizona, Washington, New York, and Connecticut. Presently, over 650 local flood warning systems are operating.

In the ALERT program, NWS provides the community, at nominal charge, with the necessary aids and technical advice on installation and operation of flood warning equipment. Flood forecasting procedures are designed for individual forecast locations, and training is provided to local officials. The local community is responsible for the purchase, operation, and maintenance of the equipment and for making its own special flood forecasts. ALERT is thus a simple, community-initiated, cooperative effort with NWS, that requires an initial community investment of about $50,000. And, although ALERT satisfies community needs, we must note that the system provides warning information only for specific points, is dependent on local non-hydrologists who have other primary duties, and is dependent on the variabilities of community planning programs and budgets. Furthermore, most of the data obtained from ALERT are not available to the national data files, although the data can be transmitted to the local RFC, WSFO, or WSO. Nevertheless, the self-help program has proved effective, especially in flash-flood situations.

Another similar program is a cooperative arrangement with joint Federal and State funding of about $2 million. IFLOWS, the Integrated Flood Observing and Warning System, is an experimental program conducted by NWS, the Appalachian Regional Commission, and the States of Kentucky, Virginia, and West Virginia to provide an enhanced flood warning service to the Appalachian region. Similar to ALERT, the basic observations and weather forecasting products from NWS are needed to provide a complete forecasting system.

The objective of IFLOWS is to implement a regional flood forecasting system which takes into account flash flood problems extending across geographic and political boundaries and beyond the funding and operational capabilities of any single community. Although still evolving, IFLOWS seems to be meeting the needs of the Appalachian region. The system combines existing sensors, communications, and computer technologies with forecasting techniques and computer model analyses to provide guidance and advice to State and local officials responsible for emergency services. IFLOWS provides for issuance of site-specific warnings of local floods 30 minutes to 3 hours in advance of floods. The observations and warnings also are transmitted to the RFCs, WSFOs, and WSOs. At present, IFLOWS is deployed throughout a 12-county region at the intersection of the three States. There are plans to expand the system to about 75 counties in the States of Pennsylvania and Tennessee.

The Role of the Private Sector

Although private sector direct participation in hydrologic forecasting services is relatively small, that which exists is nevertheless performing an important function. Numerous consulting firms provide hydrologic services for build-

Flash Flood in New Mexico.

CREDIT: Artesia (New Mexico) Daily Press.

ing of dams and similar construction enterprises, and it is not uncommon for a civil engineer to deal with run-off, drainage, and sewer problems of municipalities. However, none of these consulting firms engage in flood forecasting activities, per se. By far, the largest role for the private sector in river and flood forecasting is in the dissemination of flood warnings. The two other functions—data collection and data analyses and forecasting—would be of little benefit without the third function, dissemination. In fact, it is universally recognized that without the participation of commercial television and radio, timely flood warnings to the public would not be possible.

CHAPTER 3

Improving the Service

Present System

From the foregoing, the river and flood forecasting and warning system can be characterized as complex—incorporating the combined efforts and resources of Federal, State, and local governments, as well as important efforts by private citizens who participate in the volunteer observer program conducted by the National Weather Service (NWS).

As we indicated earlier in this report, the statutory authority for flood forecasts and warnings rests with NOAA, and the focus within NOAA is the hydrologic services program of NWS. However, the NWS hydrologic services depend on many Federal and State agencies and others for a major share of the information required to meet river and flood forecasting and warning responsibilities. NWS is the source of basic weather and precipitation information; the U.S. Geological Survey (USGS) provides streamflow data from its water resource investigations effort; the U.S. Army Corps of Engineers (COE) provides stream and reservoir gauge data from its own work on dams and reservoirs; and the Soil Conservation Service (SCS) provides snow survey data necessary for water supply forecasting. Of the 16,000 or so stream gauges installed throughout the country, most are operated by USGS and COE. The bulk of the rainfall data are obtained from some 6,000 volunteer observers, who call in their observations of 1/2 inch or more daily precipitation to the Weather Service Forecast Offices (WSFOs) and the Weather Service Offices (WSOs). And, to ensure the timely dissemination of flood alerts and warnings to the public, there is the critical service provided by the radio, television, and the newspapers.

How much of the flood-prone areas are covered by the present system? A percentage of the Nation's population served would seem to be a reasonable measure. If we counted the number of inhabitants served by a site-specific flood forecast, we would probably find that nearly all of the metropolitan areas with one or more flood-prone sites identified have at least one point that receives a site-specific forecast. This type of measure, however, is misleading with respect to all flood-prone areas where the population and property are considered vulnerable.

As indicated previously, over 20,000 flood-prone sites in the Nation have been identified. Of these, about 3,000 receive site-specific flood forecast service from NOAA. And, beyond site-specific river and flood forecasts and warnings, NOAA's "generalized" forecasts are provided along the major tributaries and large rivers. Thus, most flood-vulnerable areas receive some form of service. Yet, even with all the elements of the current system—Federal, local, and cooperative—operating at maximum effectiveness, NOAA has estimated that data adequate for acceptable service would be available for only one-half of the Nation's required river forecast points. The difficulties lie not merely in the number of gauges but in the overall operating mechanics of the system. Recent studies by NWS have shown the relationship of a river basin geography to the number of rain gauges or measurement points needed to predict flood crests and to the required sampling rate for data flow. The interval between measurements required for reliable service is one which is less than one-fourth the potential flood lead time for the basin. The potential lead time at a flood forecast point is the time lag from the occurrence of rainfall over the basin to the onset of the resulting runoff at that point. According to NOAA, 35 percent of the current forecast points have potential lead times that require sampling intervals of 6 hours or less. And, since the dominant flow of data collection is provided from volunteer observers who provide daily reports, the optimal sampling intervals, considering all sources, are estimated to be available from only 30 to 50 percent of the existing forecast points.

Clearly then, there are deficiencies in the system, its operation, and its coverage. One way to handle most of these would be the infusion of much more money to the central NOAA river and flood forecasting and warning service. We can only guess at the magnitudes. For example, NOAA believes the addition of about 2,000 automated rain gauges by NWS, and the planned network procurement by the other cooperating agencies, are needed to complete even the current 3,000 forecast points to a fully adequate and reliable network. The procurement and maintenance costs for 10 years for these 2,000 NWS gauges, including spares, would be about $15 million. Providing coverage to the more than 20,000 flood-prone sites is not easily extended from this figure, because over 50 percent of the balance of 17,000 sites are located in small areas that would require increased measurement densities for adequate coverage. The costs would certainly be considerable.

It can be argued that the optimum network would be a system independent of reliance on other Federal agencies and on voluntary citizen participation. While we might concur in principle that such an objective is utopian, we do not consider it realistic, necessary, nor appropriate. Certainly the various parts of the complex system do pose problems and require considerable attention by the central core of flood forecast responsibility in NOAA because of the tenuous nature of much of the external capabilities. Yet, the system does provide significant service and is an example of considerable avoidance of duplication in the Federal area.

For these reasons, we have reviewed the system in order to seek and bring to the attention of those responsible the improvements which we believe merit serious consideration on behalf of public safety. Although some of these improvements may require additional funds, we believe the benefits significantly exceed the modest costs.

Public Cooperative Systems

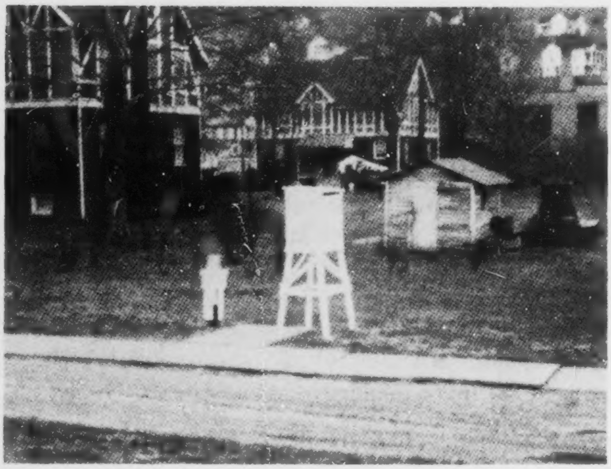
The dominant provider of hydrologic data to the flood forecasting system is the volunteer citizen cooperative observer. The procedures established call for reports every six hours after the first one-half inch of rainfall has fallen. However, in practice, the compliance is in many instances flawed. Reporting is often only twice each day during a rainfall episode, with less than consistent reporting times among individuals, sporadic reporting with some observers omitting some calls during a rain period, calling in randomly, or reporting measurements at times different than the times of observation. Moreover, there is the problem of large sparsely populated areas without volunteer observers, which leaves large gaps in the observational network. The difficulty at the WSFO, WSO, and RFC locations and at the national level in developing a consistent data base from such information is evident.

The local volunteer observer program has strengths and weaknesses. There are problems of reliable implementation. Yet, it is inherently cost-effective. We believe additional small resource increments to expand the network and to provide some observer reporting redundancies would pay off immeasurably in broadening service and in covering some of the uncertainties and unreliabilities that inevitably occur when no real-time data are available. But we do see the need for NWS installing some automated gauges where critical unmet needs exist.

Thus, we do not suggest abolishing the cooperative volunteer efforts nor other systems, such as ALERT and IFLOWS. In fact, we recommend their strengthening. The potential or lessening losses from floods should provide considerable self-interest and motivation for local participation. Such efforts, however, are as effective as the management attention and continuity of interaction with the public provided. For ALERT and IFLOWS, cooperating local and State management programs have been assembled to provide the necessary participating and continuing leadership. In general, it seems the effectiveness and growth of self-help programs, the volunteer observer program in particular, have been limited by the availability of NOAA hydrologists to participate in such public education and technology transfer efforts. It is our view, that while an increase in NOAA's field hydrology strength may be needed to provide increased interaction and management attention to the individual cooperative observers, any increase could be incremental and should be directed toward developing and sustaining the necessary local efforts to maintain the systems. Moreover, there exist advisory agents in the field operating through such programs as Land Grant and Sea Grant that might well be recruited to motivate and train effective volunteer observers.

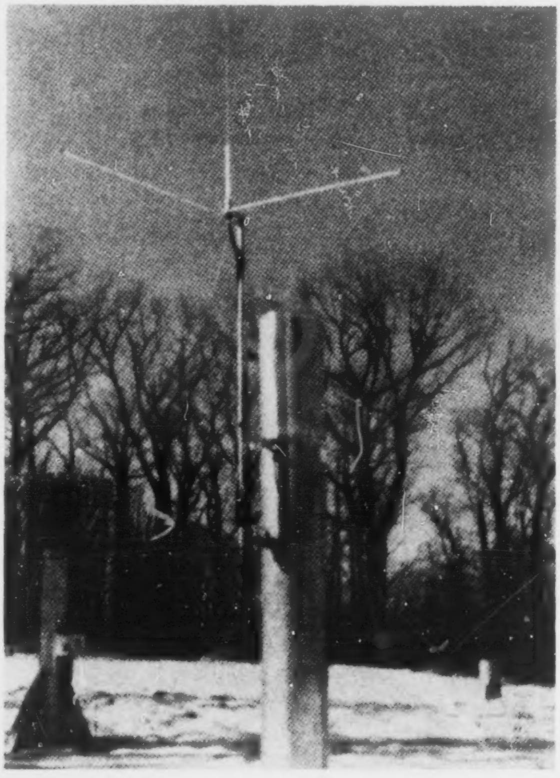
We recommend, therefore, that the National Oceanic and Atmospheric Administration place high priority on:

(a) Providing additional hydrologists to improve the effectiveness of the volunteer cooperative observer program, and on



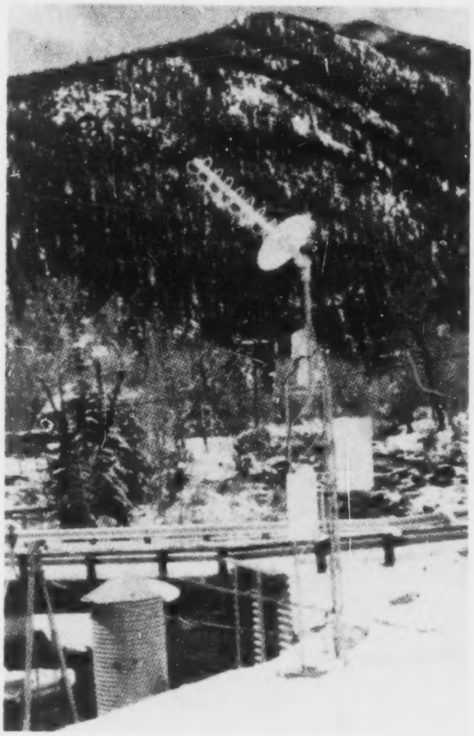
A typical official volunteer cooperative station. In the foreground are a bucket-type rain guage (left) and a shelter that contains the thermometer for temperature measurements.

CREDIT: National Weather Service/National Oceanic and Atmospheric Administration.



This automatic radio-reporting gauge is used in the IFLOWS and ALERT programs.

CREDIT: National Weather Service/National Oceanic and Atmospheric Administration.



Automated rain and stream gauges operated by the U.S. Army Corps of Engineers. The rain gauge and radio equipment are mounted on the tower. The stream gauge is inside the housing shown in the lower left corner. Data are transmitted by NOAA satellite to the National Weather Service Offices.

CREDIT: U.S. Army Corps of Engineers.

Gauge at a U.S. Geological Survey stream gauging station. The measuring device is located in the river at the bottom of the gauge house; recording equipment is located at the upper level.

CREDIT: U.S. Geological Survey, U.S. Department of the Interior.

(b) Extending community self-help programs, such as the Automatic Local Evaluation in Real Time (ALERT) system and the Integrated Flood Observing and Warning System (IFLOWS).

We estimate that these actions will require the addition of one or two hydrologists at each of the River Forecast Centers or at selected Weather Service Forecast Offices, depending on the local situation.

The Federal Complex

It bears repeating that NOAA's river and flood forecasting and warning performance effectiveness is heavily dependent on others. At the Federal level, the system could not work without the NWS hydrometeorological data and other data and information systems provided by USGS, COE, and SCS, which are acquired for their own purposes and with their own resources at no cost to NOAA.

The question here is of coordination and network design. Although the gauges of these other contributing agencies do provide necessary data, their placement coincides primarily with the agency's mission needs, and not necessarily with those of NOAA for flood analyses. Although NOAA's needs are considered, we see potential problems. Movement or discontinuance of gauges operated by these agencies can and does impact the data flow to NOAA. Removal of existing gauges by these agencies, either from lack of need or from lack of adequate resources to maintain their own systems—an increasing problem—could at some future time critically impair the NOAA service. Because all agencies involved are aware of their interrelationships in flood forecasting, some measure of positive interagency coordination should be evident in view of the seriousness and frequency of flooding events.

Circular A-67 of the Office of Management and Budget (OMB), issued August 25, 1964, prescribes guidelines for "coordination of Federal activities in acquiring water data from streams, lakes, rivers, estuaries, and ground water.... excluded are activities concerned with research plots and experimental watersheds, and data on precipitation, evaporation, snow accumulation and soil erosions." It also provides that "The Department of the Interior (DOI) is responsible for exercising leadership in achieving coordination of national networks and specialized water data activities." In essence, A-67 affirms DOI leadership, which is delegated to USGS, and the central Federal coordinating role in the acquisition of certain water data but is silent on river and flood forecast and warning services. Similarly, OMB Circular A-62, issued in 1963, affirms the central role of the Department of Commerce for basic meteorological services but also is silent on river, flood, or any other hydrological service.

The Water Resources Council created in the 1965 Water Resources Planning Act (P.L. 89-80) was provided a charter which, while not specifically directed at flood situations, could be interpreted to provide needed coordination. The Council membership includes the Secretary of the Interior as Chairman; the

Secretaries of Agriculture, Army, Commerce, Energy, Housing and Urban Development, and Transportation; and the Administrator of the Environmental Protection Agency. Its legislated responsibilities include oversight of regional or river basin plans and programs in relation to the adequacy of coordination of the water and related land resources policies and programs of the several Federal agencies. It includes establishment of principles, standards, and procedures for Federal participants in the preparation of comprehensive regional or river basin plans and for the formulation and evaluation of Federal water and related land resource projects. We are not aware that the Council's activities in the past have considered policies concerning public flood warnings. At this time, however, its relevance to the coordination issues under discussion is moot. The Council was not funded for Fiscal Year 1982, and its staff has been dispersed. Thus, while it remains in the law, it is not now a functioning entity.

Our review has found two other coordinating mechanisms that should be noted. Under the auspices of A-67, the U.S. Geological Survey's Office of Water Data Coordination (OWDC) has organized a Federal Advisory Committee on Water Data. This Committee provides coordinated interagency advice to OWDC to meet that Office's needs. The Director of NOAA's Office of Hydrology serves as the Department of Commerce (DOC) member. Thus, while serving a purpose not specifically flood system related, the Committee provides at least a meeting ground for information exchange from the appropriate agencies at working levels.

The Committee on Atmosphere and Oceans (CAO), under the Federal Coordinating Council for Science, Engineering and Technology, is the other coordinating body. This Committee, however, has not met in the past several years. The Subcommittee on Atmospheric Research of CAO is an active group that meets regularly, but its interests are primarily research oriented and do not include hydrologic matters.

In summary, we find that there has not been in the past, nor is there now, an adequate arrangement for coordinating and considering the relationships of the critical contributions of several Federal agencies to the operational effectiveness of the government's river and flood forecasts and warnings provided to the public by DOC through NOAA and its NWS hydrologic service.

Therefore, we recommend that the National Oceanic and Atmospheric Administration (NOAA), as the agency responsible for flood forecasting, take the initiative, in association with the U.S. Geological Survey, the U.S. Army Corps of Engineers, the Soil Conservation Service, and others, to establish a policy-level interagency coordination mechanism necessary to ensure appropriate consideration and necessary remedial action whenever changes to the hydrologic data network not under NOAA control are contemplated.

Such means can ensure that the impact of changes on the data network on the quality and effectiveness of flood forecasting and warning and their effect on public safety will be understood, will be brought to the attention of the appropriate forums, and will be dealt with adequately. Moreover, effective coordination could eliminate some other basic operational problems. We understand, for example, that the Tennessee Valley Authority (TVA) provides about 90 percent of the rain gauge data within its region. Yet, when TVA's needs for real-time data are not critical, the information,which is important to NWS, is often delayed--such as weekend information not reported until Monday. Additionally, with TVA and other agencies in the field, further standardization of data formatting and handling is needed. These are important considerations and susceptible to resolution, we believe, by the improved communications high-level coordination would foster.

Therefore, we recommend that the Office of Management and Budget (OMB) establish appropriate guidelines and criteria for the planning and operations of the flood forecasting and warning services through an OMB circular similar to that provided weather services under OMB Circular A-62, or that OMB revise A-62 to include hydrological flood forecasting services under the Federal Coordinator for Meteorological Services and Supporting Research provided in that Circular.

Other Arrangements

In describing the Nation's Hydrologic Services in Chapter 2, we made only brief reference to TVA and the Bonneville Power Authority. These authorities have staff hydrologists who provide their organizations with river and flood forecasts for their own management purposes. Coordination with NOAA hydrologists is close and useful. Thus, there is no question that the forecast skills are available, and we see a possible benefit to the entire system if these. capabilities could be used by the National Weather Service during critical times.

Under current laws, however, official government flood forecasts and warnings can only be issued to the public by NOAA's National Weather Service. It was suggested to us that "deputizing" TVA personnel to issue flood warnings might solve this problem. However, there are other problems as well, such as forecast liability, time of hydrologist service availability, integration of communications, and other similar problems. Nevertheless, we believe there are sizable capabilities here that compel serious consideration. ***We recommend that the National Oceanic and Atmospheric Administration, working with the Tennessee Valley Authority and Bonneville Power Authority:***

(a) Explore the legal, institutional, hydrologic, and cost-effective feasibilities of using, during critical flood forecast conditions, the hydrologic capabilities that exist in organizations, such as the Tennessee Valley Authority and the Bonneville Power Authority, into its river and flood forecasting and warning system, and, if found practical,

(b) Take whatever actions are required, including recommendations for appropriate changes to legislation, to implement this concept.

Technical Improvements

Earlier, we briefly noted that NOAA's hydrologic services were being provided satellite imagery and estimates of rainfall from NOAA's National Environmental Satellite, Data, and Information Service (NESDIS). Satellite observations do hold considerable potential in increasing the effectiveness of flood forecasting. NESDIS developments underway may lead to enhanced satellite capabilities in estimating heavy rainfall. At present, satellite systems are used in the networks primarily as communications relays and to add mesoscale space-time distribution information to the *in situ* gauge networks. And, while we recognize their essential contributions, present techniques do not offer much prospect in the near term for reducing the network densities of field observations from *in situ* gauges.

In our view, it is in the area of seemingly minor technical improvements that considerable effectiveness can be gained for the river and flood forecasting and warning system. Of those we have studied, we believe the following items are worthy of support:

(a) At present, NWS has evolved distinct data sets for its several weather observation systems (radars, satellites, rain gauges, upper air soundings, etc.). Probably because of the lack of resources and the low priority generally accorded data management in government, these data sets are not integrated. This means, for example, that the technique for verifying rainfall measurements received from radars to the actual measurements of rainfall obtained from rain gauges is not available to the forecaster in "real-time," i.e., current data. Furthermore, because of the lack of integration, all the information on rainfall is not generally available to NMC in developing its precipitation forecasts. We see a major improvement from this integration of meteorological and hydrological data bases to river and flood forecasting, as well as to weather forecasting. Such an effort is solely within the purview of NOAA.

(b) At present, although the rain gauge data network is extensive, there are deficiencies, especially in sparsely populated areas where the volunteer observer effort is inadequate, and in those critical areas where sampling rates are major factors in flood warnings. An increase in the number of automated rain gauges in these areas would have a major positive impact on river and flood forecasting and warning effectiveness.

(c) We have noted that considerable information is provided to the NOAA hydrologic service by other agencies. In some cases, however, significant amounts of data, particularly automated rainfall measurements, such as provided by the U.S. Army Corps of Engineers gauges, cannot be used in a timely way in critical situations, because the data are received in a form not compatible with the NWS data processing system. Standardization of data formats among agencies collecting similar types of hydrological data could significantly improve the effectiveness of even the current forecasting system. A start has been made but presently involves only the Corps of Engineers and NWS.

(d) Research and development are key elements in improving the flood forecasting capabilities of NWS. In the short-term, efforts to calibrate the existing numerical models, tailored to specific river basins, are essential. In the long-term, coupling the models for weather prediction with those for flood forecasting would lead to significant improvements in flood forecasting.

(e) Among the technical support items provided to NOAA's hydrologic services by the NWS National Meteorological Center (NMC) is the "Quantitative Precipitation Forecast" (QPF). NMC produces forecasts of quantitative precipitation through its numerical models. Statistical relationships then provide estimates of probability of occurrence of measurable precipitation and the amount of precipitation. After combining precipitation probabilities with other observed and forecast atmospheric conditions, analysts also prepare centralized QPF guidance products. The RFC hydrologists and the WSFOs receive the QPF products, update or modify them, and use them as input to their flood forecast and prediction procedures. It is generally recognized that QPF model improvement is necessary for improved flood forecasting and is believed possible. A 1980 report of the National Academy of Sciences (NAS, 1980) states that:

> While there has been slow but steady improvement in the accuracy of weather forecasts over the past decade, stubborn problems remain. Precipitation forecasts represent both the most important and the most difficult problem area, but there is considerable evidence that economically significant advances in forecasting accuracy are within reach.

(f) The volunteer cooperative observer and other local and regional programs use telephones for communicating observations. In recent years, the technology of telephone communications has resulted in significant improvements to reliability and rapidity of transmission. In particular, we would highlight the "Touch-Tone" system of contact and coded relay that could not only expedite information relay but also could improve efficiency by incorporating standard digitized reporting at the observing end. Significant benefits are available at relatively small costs by providing the "Touch-Tone" capability to observers.

For these reasons, ***we recommend that the National Oceanic and Atmospheric Administration plan and budget for the necessary technical improvements and research efforts to the Nation's flood forecasting and warning services, including:***

(a) The integration of all meteorological and hydrological data bases in the National Weather Service;

(b) The installation of automated rain gauges in areas of sparse volunteer observer availability and in critical areas requiring high sampling rates;

(c) The development, with other agencies, of a national real-time (current) hydrologic data base with standardized formats;

(d) Efforts to improve the numerical models for flood prediction, including the calibration of models;

(e) Efforts to improve the Quantitative Precipitation Forecast models; and

(f) The introduction of "Touch-Tone" telephone volunteer observer reporting.

The total cost to implement all of the technological improvements has not been determined. Some, such as the computer programs, or "software" development, for the data bases and integration of data sets, will undoubtedly take considerable time and effort. At this time, we can only suggest that the cost for the observer "Touch-Tone" telephone system may be on the order of $150,000 per year, and that the procurement and 10-year maintenance costs for providing 2,000 automated rain gauges, which NOAA has determined are needed for the current 3,000 site-specific forecasting points, would be about $15 million. In view of the current economic situation and considering a reasonable start-up period, we would support a NOAA implementation plan to accomplish the above in 5 years.

Flood Forecasting and Flood Insurance

Finally, we introduce a new concept that could importantly affect local flood forecasting and warning. This new concept holds significant promise, and we believe may increase incentives for local and regional participation and contribute to the Federal resources that are required to implement some of our earlier recommendations.

In 1968, the National Flood Insurance Act was passed to encourage State and local governments to make land use adjustments, to constrict the development of land exposed to flood damage, and to minimize damage caused by floods. Additionally, it established a National Flood Insurance Program allowing homeowners, businesses, and local government facilities to purchase federally subsidized insurance at low cost through local agents when certain flood plain management regulations and ordinance were in place. Up to that time, it was difficult, if not practically impossible, for those living in flood-prone areas to obtain flood insurance at reasonable rates from private companies.

This Federal flood insurance program, managed by the Federal Emergency Management Agency (FEMA) through its Federal Insurance Administration (FIA) was slow in getting started. At the time of Tropical Storm Agnes in 1972, for example, only two flood insurance policies had been sold in the Wilkes-Barre, Pennsylvania, area where devastating floods caused damages over $3 billion. Lack of public awareness of the insurance program was a factor, as was lack of insurance agent motivation and sales effort, failure of local communities to seek eligibility, and general lack of concern about flood insurance (NSF, 1980). By the end of 1981, however, over 17,000 communities and other political subdivisions across the country were participating in the program, with 1.9 million policies in force providing over $99 billion in flood insurance coverage.

From 1968 to the end of 1981, the Federal Government has provided about $1.5 billion in flood insurance program subsidies. The General Accounting Office reports that (GAO, 1982):

> According to unaudited FEMA records about $866 million has been collected in insurance premiums during this period, but $1,249 million has been paid to the insured for flood claims. In addition, over $408 million has been paid to the operating contractor, insurance agents, and claims adjusters; $520 million has been spent to prepare community flood maps; and $174 million has been incurred for interest expense on U.S. Treasury borrowings.

Our primary interest is not with the insurance program, however, but with the possible relationships between that program, with its significant costs to the Federal Government, and flood forecasting services. It is our view that the quality of such forecasting services has a direct relationship on losses suffered and thus on insurance costs. It would follow, therefore, that the relationship could extend to the flood insurance charges and premium schedules.

We are not aware that this relationship between the costs for flood insurance, both premiums and claims, and the availability and quality of flood forecasting and warning services has ever been quantified. Nevertheless, it would seem reasonable that a flood insurance premium that takes into account the presence and quality flood forecasting and community preparedness programs could result in cost reduction, with larger reductions for those areas with highly integrated and automated systems.

To the degree that this is borne out, an incentive in the form of a reduced flood insurance premiums could encourage a local community to establish or augment a self-help effort for improved flood forecasting and warning systems from its own resources. Moreover, improved local systems could result in reduced Federal flood insurance related costs and possibly in other Federal relief payments. The Federal Government's lower pay outs in these areas could then offset the additional Federal resources necessary to increase Federal assistance to the local communities, to integrate these systems into the regional networks, and to support improved public service from the central Federal service. A potentially sizable reduction in Federal flood management expenditures, together with reduced local flood premiums, seems to be a "business" proposition that cannot be ignored.

We recommend, therefore, that the Federal Emergency Management Agency, in cooperation with the National Oceanic and Atmospheric Administration, undertake take a comprehensive study of a selective region to determine:

(a) The relationships between several levels of river and flood forecasting and warning services and Federal, local, and individual flood insurance costs; and

(b) The feasibility of a flood insurance schedule that incorporates as a factor the degree of flood services and preparedness programs available to a community; and, based on these studies, take whatever actions are required to implement this concept, including recommendations for appropriate changes to legislation.

REFERENCES

Bureau of the Census.
1981. Statistical Abstract of the United States, 1981. 102 edition, U.S. Department of Commerce, Washington, D.C., 1,031 p.

Day, Harold J.
1973. Benefit and Cost Analyses of Hydrological Forecasts. WMO-No. 341, World Meteorological Organization, Geneva, Switzerland, 33 p.

Day, H.J., and K.K. Lee.
1976. Flood Damage Reduction Potential of River Forecast Services in the Connecticut River Basin. NOAA Technical Memorandum NWS-Hydro-28, National Oceanic and Atmospheric Administration, U.S. Department of Commerce, Washington, D.C., 52 p.

Environmental Science Services Administration.
1969. A Plan for Improving the National River and Flood Forecast and Warning Service. Office of Hydrology, Silver Spring, Maryland, p. 16.

General Accounting Office.
1982. The National Flood Insurance Program — Marginal Impact on Flood Plain Development. CED-82-105, Washington, D.C., 59 p.

GKY and Associates, Inc.
1981. Benefit Model NWS Gauging Network. A Report to the National Weather Service. Contract No. A01-78-4068. Springfield, Virginia, 90 p.

Holmes, A.
1981. NACOA Hydrology Panel Meeting Transcript. Statement before the National Advisory Committee on Oceans and Atmosphere. Washington, D.C.

National Academy of Sciences.
1980. Technological and Scientific Opportunities for Improved Weather and Hydrological Services in the Coming Decade. Select Committee on the National Weather Service, National Research Council, Washington, D.C., 87 p.

National Science Foundation.
1980. A Report on Flood Hazard Mitigation. Washington, D.C., 253 p.

Owen, J.H.
1978. Summary of Water Resources Information for Meteorologists/Hydrologists of the National Weather Service Engaged in the Flood and Flash Flood

Warning Program. National Oceanic and Atmospheric Administration, U.S. Department of Commerce, Washington, D.C., 116 p.

Water Resources Council
1977. Estimated Flood Damages. Washington, D.C., 100 p.

U.S. Army Corps of Engineers.
1983. Letter to Dr. James Almazan, NACOA Staff, from Eugene A. Stallings, Water Control/Quality, Office of the Chief of Engineers, U.S. Department of the Army, Washington, D.C.

APPENDIX A

Summary of Findings and Recommendations from NACOA's Report, "The Future of the Nation's Weather Services"

The Public-Private Mix of Weather Services

1. *We find the present national weather system to be a complex mix of interdependent public and private services that has evolved over the years to provide the United States with effective weather services for protection of the public, for its safety and welfare, and for the efficient operation and planning of economic activities. This kind of mix serves the public interest well.*

The Need for New Technology

2. *We find that the new technology of weather observations, communications, and data processing is indispensible to the advancement of the Nation's weather services. We recommend that policies be adopted which can permit the introduction of this technology without compromising general weather services dependent on more conventional technology.*

We believe that the risk of exposure of citizens of the United States to weather hazards can be significantly decreased by the procurement and installation of new observation, communications, display, and data processing systems. Such procurement will be costly but, in our view, the benefits will far outweigh the costs. We recommend that adequate funding be provided for the new technology.

Effectiveness of the National Weather Service

3. *We are of the opinion that the effectiveness of the National Weather Service in achieving its end objective of protecting the public and serving the economy is enhanced when there is a close relation between community and service. It is important, therefore, that "service" criteria be established to determine which and how many communities shall have local weather service provided by the Federal Government.*

We find that the proposals for changes in the number and distribution of weather stations of the past several years do not conform to well-understood criteria. We do not believe that the almost "hit or miss" approach to weather station closures of the past several years has served the Nation well.

We recommend that criteria be developed for weather station closure and establishment. We also recommend that possible cooperative funding arrangements between the Federal Government, States, and local communities be explored.

The Need for a Strong Central Government Weather Service

4. *We recommend that current policies for operation of Federal meteorological services should continue to be based on the maintenance of a strong central weather service to provide weather warnings and common weather services for all Federal agencies. Steps should be taken to ensure that these policies can be effectively implemented to prevent the establishment of multiple weather services.*

Public-Private Weather Services Responsibilities

5. *The primary responsibility for predicting life-threatening weather events should rest with the Federal Government's National Weather Service. The National Weather Service should issue general forecasts for the public. We recommend that current weather data and forecasts acquired and prepared by the Federal Government should be provided without charge to organizations and institutions that further the objective of the widest possible dissemination of weather warnings.*

We advocate a continuing role for the Federal Government in providing the specialized analyses and forecasts that serve broad economic sectors where there is a high national interest, as defined by Congress, as well as those that are required by other Federal agencies in the conduct of their missions. We see the private sector as providing analyses and forecasts that particularize information to meet the needs of specific clients or constituencies.

The Dissemination of Weather Warnings

In light of the increasing role of the private sector in the dissemination of weather information, we recommend that the Federal Communications Commission take steps to ensure that all weather emergency messages and warnings of the National Weather Service are properly disseminated, identified, and carried in broadcasts.

User Fees

6. *We find the concept of user fees for federally supplied weather information attractive but conclude that the implementation of user fees may be practical only in special cases. Many organizations that now receive weather information and data from the government free of cost to themselves, contribute valuable and otherwise unobtainable weather data, and frequently provide essential dissemination services at no cost to the Federal Government. Services designed to protect life and property should not be withheld from those unable or even just unwilling to pay. Some sectors, such as shipping, agriculture, and aviation, bulk so large in the economy and the national*

interest is so strong that the Federal Government continues to have an important responsibility for providing weather services aimed at increasing their productivity and efficiency. Where the private sector is increasing its provision of weather services, such as is increasingly the case with dissemination, quid pro quo considerations generally militate against the institution of fees.

We recommend that any establishment of user fees for private sector users of Federal Government weather data and services should take into account the quid pro quo contributions of the private sector to the observation, communication, and dissemination functions of the total national weather system. These quid pro quo contributions by the private sector provide vital elements of our weather service and are generally provided free of charge to the Federal Government to ensure effective weather service.

The aviation industry pays special excise taxes into a trust fund set up under the authority of the Airport and Airway Development Act of 1970 to support airport construction and other aspects of the infrastructure of the Nation's airways. We support the use of this fund to provide federally supplied aviation weather services. We see aviation weather services as an integral part of the Nation's airways systems. If other private sector activities, such as shipping, waste disposal at sea, and the like are brought into similar tax arrangements, we recommend that weather services applicable to those activities be funded out of such receipts.

Data Acquisition — A Federal Responsibility

7. *We recommend that the Federal Government retain full responsibility for assuring that the Nation has a data acquisition system capable of acquiring the full set of observations necessary to describe the conditions of the atmosphere and to forecast weather phenomena on all scientifically meaningful time and space scales. We see agencies of the Federal Government as the operators of the bulk of this system with some operations in special circumstances in the private sector. This policy is essential to:*

a) Provide for an integrated data acquisition system whose management can organize, coordinate, and ensure timely transmission of data from many different platforms, collected by many different entities.

b) Provide the international data exchange arranged by governments among all countries of the world to ensure adequate basic weather data necessary for preparation of weather forecasts.

c) Ensure data quality control and a system design for optimal coverage and information integration to serve both civil and national security needs.

Basic Data Analysis and Forecasting — A Federal Responsibility

8. *We recommend that the management and operation of the Nation's basic data analysis and forecasting functions continue as a Federal responsibility.*

This function produces the weather information base common to all weather service products for both public and private use. The discharge of this function requires that computer and communication resources be integrated with the data acquisition system. Only the Federal Government is in a position to discharge this responsibility as long as the data acquisition functions remain a Federal responsibility.

The Private Sector Operation of the National Weather Service

9. *If Federal funding through traditional Congressional appropriations cannot provide for the necessary acquisition of technology for weather observations, and for the basic analysis and forecasting functions, we recommend a study of the establishment of a quasi-government corporation in the private sector to undertake weather data acquisition, and basic analysis and forecasting functions. Under contract, such a corporation would provide those services required by the Federal Government and would have authority to supplement Federal funds from other sources. At this time, we do not find the establishment of a quasi-government corporation to be a desirable course of action, because we do not foresee an increase in efficiency.*

The Interdependence of the Nation's Weather Services

10. *We believe that, in any planning for change in financing and management of weather services, recognition must be given to the fact that the Nation's weather services involve the pooled activities of a number of Federal agencies as well as institutions in the private sector and that all elements need to be considered.*

APPENDIX B

NACOA'S Hydrology Panel Members

Panel Chairman
Paul Bock
Professor
Department of Civil Engineering
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Panel Members
Jay G. Lanzillo
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APPENDIX C

Session Participants, Individuals and Offices Visited, and Field Sites Visited

Session Participants

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Director
Weather and Flood Warnings Coordination Staff
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Field Sites Visited

Tulsa River Forecast Center
National Weather Service
Tulsa, Oklahoma

Lower Mississippi River
Forecast Center
National Weather Service
Slidell, Louisiana

APPENDIX D

List of Acronyms

ALERT — Automatic Local Evaluation in Real Time System
CAO — Committee on Atmosphere and Oceans
COE — U.S. Army Corps of Engineers
DOC — Department of Commerce
DOI — Department of the Interior
FEMA — Federal Emergency Management Agency
FIA — Federal Insurance Agency
FY — Fiscal Year
GAO — General Accounting Office
IFLOWS — Integrated Flood Observing and Warning System
NACOA — National Advisory Committee on Oceans and Atmosphere
NAS — National Academy of Sciences
NESDIS — National Earth Satellite, Data, and Information Service
NFIP — National Flood Insurance Program
NMC — National Meteorological Center
NOAA — National Oceanic and Atmospheric Administration
NWS — National Weather Service
OMB — Office of Management and Budget
OWDC -- Office of Water Data Coordination
QPF -- Quantitative Precipitation Forecast
RFC — River Forecast Center
SCS — Soil Conservation Service
SNOTEL — Snow Telemetry System
TVA — Tennessee Valley Authority
USDA — U.S. Department of Agriculture
USGS — U.S. Geological Survey
WRC — Water Resources Council
WSFO — Weather Service Forecast Office
WSO — Weather Service Office

**NATIONAL ADVISORY COMMITTEE
ON
OCEANS AND ATMOSPHERE**
3300 Whitehaven Street, N.W.
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Testimony of

Paul Bock
Member, National Advisory Committee
on Oceans and Atmosphere
before the
Subcommittee on Investigations and Oversight
Committee on Science and Technology
U.S. House of Representatives

October 14, 1983

Mr. Chairman and Members of the Subcommittee:

My name is Paul Bock, a member of the National Advisory Committee on Oceans and Atmosphere (NACOA)*. I am Professor of Hydrology and Water Resources at the University of Connecticut, Storrs, Connecticut. Dr. John Knauss, NACOA Chairman, asked me to testify on behalf of the Committee. I was Chairman of the NACOA Panel which prepared the report, "The Nation's River and Flood Forecasting and Warning Service," earlier this year, and I appreciate this opportunity to participate in the Subcommittee's review of the recent floods in the lower Colorado River. My comments will address the services now provided by the Federal Government in flood forecasts and warnings, and the recommendations for improvement which NACOA believes can be made in the near future without substantial financial outlays.

In our deliberations, we heard from current and former officials of the National Weather Service, U.S. Army Corps of Engineers, U.S. Geological Survey, Soil Conservation Service, Tennessee Valley Authority, and the Federal Emergency

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*NACOA is an 18-member advisory committee established by Congress to report to the President and to the Congress its assessments of the status of the Nation's marine and atmospheric activities and to advise the Secretary of Commerce with respect to carrying out the programs administered by the National Oceanic and Atmospheric Administration. The members are appointed by the President.

Management Agency. We made on-site visits to the Tulsa River Forecast Center in Oklahoma, and the Lower Mississippi River Forecast Center in Slidell, Louisiana. And we also visited the Office of the Governor of Louisiana during the Mississippi floods earlier this year to obtain information about the floods and the flood warning systems.

The Nation's average annual damages due to floods are nearly $2 billion, with an average of 185 fatalities. Flood damages in the Nation have approached $4 billion twice in the past 12 years. If the losses could be reduced by 10 percent -- and this is possible, according to various reports -- annual savings of at least $200 million could be realized. We believe that the capability and the technology exist to increase the effectiveness of the service and reduce loss of life and property.

The focus of the NACOA review was on the extent and adequacy of the services provided by the National Oceanic and Atmospheric Administration (NOAA) through its National Weather Service's hydrologic program. This program is provided at a marginal cost of about $15 million, the cost of flood forecasting services above the costs of the systems and services needed for NOAA's weather functions. NOAA's hydrologic program is an integral part of the NWS weather forecasting system; all of the new technologies for weather observations, analyses, and dissemination that affect the weather services affect the hydrologic services. In its 1982 special report to the President and the Congress, "The Future of the Nation's Weather Services," NACOA presented a series of findings and recommendations relevant to greater efficiency and effectiveness of the weather services. We stated our view that a modern National Weather Service able to detect, analyze, and predict weather phenomena at all time and space scales is essential for effective flood forecasts and warnings. But there are other technological requirements for hydrology beyond those of weather services, such as automated rain gauges and stations that relay information via satellite platforms.

Before going into detail about the NACOA recommendations on improving the river and flood forecasting and warning services, there is one more major point we recognized in our reports. And that is -- the Nation's weather and hydrologic services are a complex mix of public and private services, greatly interdependent. We found that this mix serves the Nation's citizens well.

Local flood warning systems are making major contributions to the system and becoming increasingly important. These are cooperative arrangements between the National Weather Service (NWS) and local or State governments. Over 650 local flood warnings system are in operation. The flood warning systems are purchased and maintained by the local municipalities, with assistance provided by NWS in developing of procedures for local operations. The major self-help system is Alert, the Automatic Local Evaluation in Real Time system. This program has spread from California to Arizona, Washington, New York, and Connecticut. Specifically, NWS provides the community with the necessary aids and technical advice on installation and operation of flood warning equipment. The flood forecasting procedures are designed for individual forecast locations, and training is provided to local officials. The community is responsible for the purchase, operation, and maintenance of the equipment and for making its own local special flood forecasts. It requires an initial investment of about $50,000. I must note, however, Mr. Chairman, that although this self-help program is designed to meet the needs of the community, it only provides warnings for some specific points, is dependent on local non-hydrologists who have other primary duties, and is dependent on the variabilities of community programs and budgets. Under the present system, however, the data can be transmitted to the local NWS station or River Forecast Center, but they are not available to the national data file. But the self-help program is highly effective in flash flood prone communities.

Another cooperative program we noted is the State and Federal program called the Integrated Flood Observing and Warning System (IFLOWS). It is an experimental program conducted by NWS, the Appalachian Regional Commission, and the States of Kentucky, Virginia, and West Virginia to provide an enhanced flood warning service to the Appalachian region. It is a regional flood forecasting system that deals with flash flood problems extending across geographic and political boundaries and beyond the funding and operational capabilities of a single community. The program is still evolving; it is presently deployed in a dozen or so counties, I believe, but NWS is expanding the coverage.

Public cooperative efforts also include the volunteer citizen observer. Rainfall observations by these volunteers are the backbone of the rain observing network. We believe that this program can be improved by providing additional hydrologists to promote and strengthen the program by public education and technology transfer efforts. NACOA recommends that extending these types of cooperative community self-help programs -- ALERT, IFLOWS, and the volunteer cooperation observer -- be given high priority, Mr. Chairman.

At least 10 Federal departments, six independent Federal agencies, two offices and a council in the Executive Office of the President, and eight Federal-State commissions are involved in water management activities. But the four major agencies providing services relevant to river and flood forecasting and warnings are the Corps of Engineers (COE), U.S. Geological Survey (USGS), Soil Conservation Service (SCS), and NOAA's National Weather Service. The NWS's river and flood forecasting and warning service and its effectiveness are critically dependent on the data and information system provided by USGS, COE, and SCS. The present system works, but in an era of budget constraints, we see some potential problems that could be resolved by coordination. Take, for example, the network of stream gauges: removal or movement of gauges operated by these agencies can impact the data flow to NWS. We looked at the past and existing coordination mechanisms and concluded that there has not been in the past, nor is there now, an adequate arrangement for coordinating the observational network used by the river and flood forecasting and warning services provided by NOAA's National Weather Service.

Therefore, we recommend that the National Oceanic and Atmospheric Administration (NOAA), as the agency responsible for flood forecasting, take the initiative, in association with the U.S. Geological Survey, the U.S. Army Corps of Engineers, the Soil Conservation Service, and others, to establish a policy-level interagency coordination mechanism necessary to ensure appropriate consideration and necessary remedial action whenever changes to the hydrologic data network not under NOAA control are contemplated.

Moreover, effective coordination could eliminate some other basic operational hydrological problems, similar to the way operational meteorological services are handled by Circular A-62 of the Office of Management and Budget (OMB), which established the Office of the Federal Coordinator for Meteorological Services and Supporting Research.

Therefore, we recommend that the Office of Management and Budget (OMB) establish appropriate guidelines and criteria for the planning and operations of the flood forecasting and warning services through an OMB circular similar to that provided weather services under OMB Circular A-62, or that OMB revise A-62 to include hydrological flood forecasting services under the Federal Coordinator for Meteorological Services and Supporting Research provided in that Circular.

Possible benefits to the entire system could be obtained if the forecast skills of hydrologists employed by other Federal agencies, namely, the Tennessee Valley Authority and Bonneville Power Authority, were utilized. Although only NWS is the only agency, under current laws, to issue official government flood forecasts and warnings, we believe sizable capabilities exist, and, with appropriate arrangements, could contribute to greater effectiveness, especially under emergency circumstances. We recommend that the National Oceanic and Atmospheric Administration, working with the Tennessee Valley Authority and Bonneville Power Authority:

(a) Explore the legal, institutional, hydrologic, and cost-effective feasibilities of using, during critical flood forecast conditions, the hydrologic capabilities that exist in organizations, such as the Tennessee Valley Authority and the Bonneville Power Authority, into its river and flood forecasting and warning system, and, if found practical,

(b) Take whatever actions are required, including recommendations for appropriate changes to legislation, to implement this concept.

As I mentioned earlier, we reviewed the technical improvements for improved weather services and for hydrologic services. In our report, we recommend six technical improvements for hydrologic services that, while seemingly minor, can increase the effectiveness of the river and flood forecasts and warnings. It is our recommendation that the National Oceanic and Atmospheric Administration plan and budget for the necessary technical improvements and research efforts to the Nation's flood forecasting and warning services, including:

(a) The integration of all meteorological and hydrological data bases in the National Weather Service. The integration of distinct data sets -- radars, satellites, rain gauges, etc. -- is within the purview of NOAA. Such action would provide "real-time" or current information to the forecaster and to the numerical prediction models.

(b) The installation of automated rain gauges in areas of sparse volunteer observer availability and in critical areas requiring high sampling rates. Augmenting the automated main gauge network would have a major positive impact on river and flood forecasting and warning services. There are large areas without volunteer observers, and thus no data are available.

(c) The development, with other agencies, of a national real-time (current) hydrologic data base with standardized formats. A start has been made in standardizing data formats by the Corps of Engineers and NWS.

(d) Efforts to improve the numerical models for flood prediction, including the calibration of models.

Research and development are key elements in improving the flood forecasting capabilities of NWS. We believe that in the short-term, efforts to calibrate the existing numerical models for specific river basins, such as the lower Colorado, are essential. In the long-term, coupling the numerical models with those for flood forecasting would significantly improve flood forecasting.

(e) Efforts to improve the Quantitative Precipitation Forecast models. Improvements to these models are necessary to obtain greater forecast accuracy.

(f) The introduction of "Touch-Tone" telephone volunteer observer reporting. The volunteer observers use the telephone for communicating observation. The "Touch-Tone" system of contact and coded relay could expedite information and improve efficiency by incorporating standard digitized reporting of observations.

Our final recommendation introduces a concept that could fundamentally affect local flood forecasting and warning. It provides incentives for local and regional participation and could provide resources for implementing our other recommendations. The concept is that of relating the Federal flood insurance program with the level of river and flood forecasting and warning services available to a community. It is our view that the quality of flood forecasting services has a direct relationship on losses suffered and thus on insurance cost.

Specifically, we recommend that the Federal Emergency Management Agency, in cooperation with the National Oceanic and Atmospheric Administration, undertake a comprehensive study of a selective region to determine:

(a) The relationships between several levels of river and flood forecasting and warning services and Federal, local, and individual flood insurance costs; and

(b) The feasibility of a flood insurance schedule that incorporates as a factor the degree of flood services and preparedness programs available to a community; and, based on these studies, take whatever actions are required to implement this concept, including recommendations for appropriate changes to legislation.

Mr. Chairman, this concludes my testimony. I would be glad to answer any questions.

Mr. Reid. Would you be kind enough, Mr. Patefield, to give us your testimony?

Mr. Patefield. Yes, sir.

Mr. Chairman and members of the subcommittee, I am Warren Patefield of Laurel, Nebr., director of the National Association of Conservation Districts, and I currently serve as chairman of that organization's water resources committee.

NACD represents America's nearly 3,000 soil and water conservation districts in the 50 States, Puerto Rico, and the Virgin Islands. I appreciate the opportunity to appear before this subcommittee and present NACD's views in the matter of water supply and stream flow forecasting in the Colorado River Basin.

Conservation districts in the west and the thousands of farm and ranch cooperators that they serve have come to rely on the snow survey and water supply forecasting program administered by USDA's Soil Conservation Service. The program has proven to be extremely accurate and reliable for predicting spring flood flows and irrigation water supplies.

Even large metropolitan areas such as Denver use the program to develop management plans for municipal and industrial supplies.

NACD and our affiliate State associations of conservation districts in the Colorado River Basin have been longtime proponents of the snow survey program. In recent years we have supported funding to convert old manually read snow courses to the new automated precipitation data stations such as the Snotel system.

Snotel has proved to be a highly efficient data collection system that provides snowpack, temperature, and precipitation information on a very timely basis. The information is stored in computers and is accessible to anyone in need of such data. Snotel worked very well during the period in question that the subcommittee is investigating.

We understand that the National Weather Service has reviewed the course of events that preceded the high flood flows in the Colorado Basin this year. Their analysis indicates that snowmelt, precipitation, and temperature data were not available on a timely basis.

In a proposed plan to enhance the Colorado River Basin data network, the Weather Service has recommended that 42 additional Snotel and 70 new automated precipitation stations be installed in order to make accurate forecasts to the U.S. Bureau of Reclamation and the Corps of Engineers so that those agencies may develop stream flow and reservoir management plans.

An analysis of this proposal shows that all of the new sites are within 10 miles of an existing Snotel station and in two cases they are the exact same location.

NACD is concerned that the data currently available to Federal agencies responsible for stream flow forecasting is not being used to its fullest capabilities.

Perhaps the Weather Service is not aware of the specific sites where Snotel data is available and that such information is accessible on a greater than monthly or biweekly frequency.

If that is the case, we would certainly urge better cooperation and communication among all agencies involved in these programs.

As I stated, NACD supports additional appropriations to SCS to accelerate installation of Snotel sites in order to provide stream flow forecasts on a more timely basis.

If these investigations conclude that additional data collection stations are needed, we recommend that they be incorporated into the existing snow survey/Snotel network in order to avoid any application of effort that might occur if a new and separate system were developed for the Colorado River Basin.

Thank you for the opportunity to appear before you today. I would be happy to answer any questions the subcommittee may have.

[The prepared statement of Warren Patefield follows:]

NACD

Warren Patefield, Director

TESTIMONY OF

Warren Patefield
Director

National Association of Conservation Districts
before the

Subcommittee on Investigations and Oversight
House Committee on Science and Technology

October 14, 1983

Mr. Chairman, members of the Subcommittee:

I am Warren Patefield of Laurel, Nebraska. I am a director of the National Association of Conservation Districts and I currently serve as chairman of that organization's Water Resources Committee. NACD represents America's nearly 3,000 soil and water conservation districts in the 50 states, Puerto Rico and the Virgin Islands. I appreciate the opportunity to appear before this Subcommittee and present NACD's views in the matter of water supply and steamflow forcasting in the Colorado River Basin.

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As I stated, NACD supports additional appropriations to SCS to accelerate installation of SNOTEL sites in order to provide streamflow forcasts on a more timely basis. If these investigations conclude that additional data collection stations are needed, we recommend that they be incorporated into the existing Snow Survey/SNOTEL network in order to avoid any duplication of effort that might occur if a new and separate system were developed for the Colorado River Basin.

Thank you for the opportunity to appear before you today. I would be happy to answer any questions the Subcommittee may have.

Mr. Reid. Mr. Patefield, it appears from what you said, even though we have some equipment that works quite well, it doesn't work if it is not there.

Mr. Patefield. Right.

Mr. Reid. Even if you say Snotel worked very well, you also come over here and state that it is recommended that there be 42 additional Snotel devices installed and that would certainly give more information to everyone concerned. Is that right?

Mr. Patefield. Yes, sir. That recommendation to me was from the Weather Service but I think that is the essence, that they need more Snotels in their network.

Mr. Reid. Now, Dr. Bock, the statistics you have given us are really—I can't even think of a word to describe it—unbelievable. We haven't heard this in the days and days of testimony that we have heard, that the annual damage due to floods, annual damage is in excess of $2 billion; that there's an average 200 deaths each year by flooding; that 75 million people live in areas that do become flooded in flood plains, and, as far as you are concerned—and I know you are a scientist looking into all this—it is the greatest potential national disaster we have on a day-to-day basis; and that FEMA spends 85 percent of its budget on flooding.

I am sure disappointed in FEMA for a lot of reasons but, one, they did not tell us this. I don't know why it would be a secret.

Dr. Bock. This was testimony to us by one of FEMA's officials in Washington for the most recent 5-year period.

Mr. Reid. And 85 percent of all national disasters declared by the President relate to floods, and commonsense dictates that is true. And, if I reflect back on the news accounts I hear when Presidents have declared national disasters, most of the time it did relate to flooding.

I think I also heard you say we have nationwide a hundred——

Dr. Bock. I'm sorry. What I meant to say, we have 165 National Weather Service hydrologists whose main duties are to forecast floods and river flows.

Mr. Reid. It would seem to me—and I'm sure the Weather Service, based upon the other hearings we have had, will direct some of their testimony to this—would seem to me one of the problems we have is better allocation of manpower. It would certainly seem that four people to handle this river—which we have already indicated includes the city of Denver, Los Angeles, Las Vegas, Phoenix, and on and on and on, and they are not all located in one place—it would seem to me that is really underallocation of manpower.

Wouldn't that seem appropriate to you, unless we develop some of your other criteria?

Dr. Bock. My personal testimony is that this is woefully inadequate for the size of task involved.

Mr. Reid. The observations that you made, I think, are excellent. Again, I can't tell you how much we appreciate you being here.

In addition to perhaps looking at the undermanned Weather Services, generally you have recommended that there be a national effort to develop the volunteer citizen-observer type program. And I think this really makes sense based on past experience, raised in a little town near here. There was a man every day who went out and determined what the weather was, how hot it was, how cold it was, and if it rained, which was very rarely, he would call that in to Las Vegas. We did not even have a telephone then. I guess he sent it in the mail every day, I'm sure it went out by the mail.

So what you're talking about is a more sophisticated method like this. This was in the highway development facility they had.

But what you're talking about is doing it more often and submitting this information to the experts?

Dr. **Bock**. Yes, at present there are 6,000 of these dedicated volunteers but there are limitations to what they can do. Generally they report at most once a day. This may not be at the best time for flood forecast use, although there are examples of heroic actions. What is basically needed is augmentation of observation networks.

That is, automatic telemetered observations. This will help the forecasters who are on the job every day.

Mr. **Reid**. This committee has jurisdiction over NOAA and also, of course, over the Weather Service. So this is something we are going to look at very closely, and I'm sure the staff will focus a lot of attention toward this in helping prepare a report for Congress.

I don't have any questions other than to state for the third time that this is tremendous testimony because this will make our job so much easier, because now we have valid specific recommendations and they are within the jurisdictional grounds of this committee. So we appreciate it very much.

Congressman Nielson.

Mr. **Nielson**. I have a couple questions, Mr. Patefield. You indicated in your testimony that Snotel proved to be a highly efficient data collection system to provide snowpack, temperature and precipitation on a very timely basis. That's one statement.

Then you say the National Weather Service has reviewed the course of events that preceded the high floods and they felt that the snowmelt precipitation were not available on a daily basis.

How can both of those be true, Mr. Patefield, one of them isn't? Which one is not true?

Mr. **Patefield**. In my opinion the Weather Service statement is not true, because as I understand in working with Soil Conservation Service that they did provide that information. I think that can be documented.

Mr. **Nielson**. Available to anyone who needs it. Did you convey adequately to the National Weather Service that you had such data available?

Mr. **Patefield**. They certainly were aware of that.

Mr. **Nielson**. I did not ask that question. Did you convey to them——

Mr. **Patefield**. The Soil Conservation Service did.

Mr. **Nielson**. In a forceful way?

Mr. **Patefield**. I hope it was.

Mr. **Nielson**. There is something wrong here. If you have all this data available to anyone that needs it, they need it and don't have it, something is wrong in the communications system somewhere.

Second question, you asked for 42 additional Snotel automatic precipitation stations and so forth. What good would that do if you have the data already and they are not using it? What good would it do to have an additional 42 of them if they are not using the one you have already?

Mr. PATEFIELD. If you will read the testimony, the Weather Service has recommended these additional Snotel stations.

Mr. NIELSON. Again the question, why would we need additional stations if we are not——

Mr. PATEFIELD. I cannot answer why the Weather Service does not use information that is available from the Soil Conservation Services data collecting system. I don't know why they don't use it. It is available.

Mr. NIELSON. How would you propose we get this additional Snotel station; is that a budget problem or just administrative problem or——

Mr. PATEFIELD. Sure it is a budget problem, but our recommendation is that the Snotel program stay with SCS and be augmented, beefed up if it is lacking in certain areas, and be improved upon. It is a good system, it is accurate, and the information is there. You can't make people use it. The information is there.

Mr. NIELSON. We will be talking with the Weather people a little bit later, but there's something wrong if you're getting good data and not being able to get it to the right people, either their lack to pick it up from you or lack of selling it to them. Something is wrong there.

Only other question I had in general, I was a little rough on the last speaker, and perhaps unfairly so, by saying that they were not aware of the heavy runoff that would likely be coming in late May and June, and were not aware of it until that time. From your snowpack data should they have been aware a month or two ahead of that?

Mr. PATEFIELD. From information our committee received, yes, they should have been aware of that.

Mr. NIELSON. Should ground water problems existing in several parts of the country, even though it is the Western basin, should that have been a clue what might have been happening on around the basin?

Mr. PATEFIELD. I'm not sure, couldn't answer that.

Mr. NIELSON. Presuming too much to assume if you have a water problem in the vicinity it doesn't translate across.

The other questions I guess I have really are what is the mechanism, what is your administrative tie-in with the Weather Bureau? Is there some coordination? Your data reports go to the Agricultural Department is it, or where do you report?

Mr. PATEFIELD. I believe there's a representative of Soil Conservation Service on a later panel that could answer that better than I could, sir.

Mr. NIELSON. Is it Agricultural and Interior Departments don't talk to each other?

Mr. PATEFIELD. With your permission, I would refer that.

Mr. NIELSON. I think you have an opinion on that.

Mr. PATEFIELD. I think it's obvious they haven't been coordinating their activities.

Mr. NIELSON. Who is not?

Mr. PATEFIELD. I don't know.

Mr. NIELSON. Maybe that's too easy a question, but I'd like an answer. Why do Federal agencies, Federal departments, both of which are important and have shared responsibilities in terms of flood control—it seems like they ought to be very closely coordinated. Maybe one should be transferred to the other, or vice versa.

Mr. PATEFIELD. I agree with you and would like to know the answer.

Mr. NIELSON. Which way would you like it?

Mr. PATEFIELD. The answer?

Mr. NIELSON. Which way would you like it? Would you like to transfer the Soil Conservation Service to the Interior or like the Weather Service to be transferred to Agriculture?

Mr. PATEFIELD. Well, I think the Soil Conservation records stands on its own. It has done a good job.

Mr. NIELSON. You are not answering my question. Which way would you like it? Like to transfer the whole Soil Conservation System, lock, stock, and barrel over to the Interior?

Mr. PATEFIELD. Never.

Mr. NIELSON. What is that?

Mr. PATEFIELD. Never.

Mr. NIELSON. You did have an opinion all along, didn't you?

Thank you.

Mr. REID. One last question, Mr. Patefield, what is your organization's evaluation of the Weather Services forecast this year for the Colorado?

Mr. PATEFIELD. We have not taken an official stand on that, but our committee met in July, our resource committee and were of concern to use this data and——

Mr. REID. I think you answered the question.

Thank you very much.

Mr. NIELSON. Like to thank you also.

Mr. REID. We would now call Miss Barbara Lausche, who is a project director for the Office of Technology Assessment.

In introducing yourself we would appreciate very much your indicating to us what the Office of Technology Assessment is. I know I think, but it would be appreciated for those people in the audience and media if you would tell us what this office does.

STATEMENT OF BARBARA J. LAUSCHE, PROJECT DIRECTOR, OFFICE OF TECHNOLOGY ASSESSMENT

Miss LAUSCHE. First of all, I'd like to thank you for the opportunity to participate in this hearing. The reason I am here is to offer some of the findings of a study that the Office of Technology Assessment has just completed.

Some of the findings have broad policy implications that I think relate to the specific issue of this hearing even though we did not specifically examine the incident of this past summer.

As you mentioned, you are aware OTA is a nonpartisan analytical support agency that serves the U.S. Congress. Its purpose is to help Congress deal with the increasingly complex and highly technical issues that are confronting our society. We serve in a national perspective and generally focus on long-term implications of technology in major problem areas.

We are a sister agency to the General Accounting Office, GAO, which generally will look at more site-specific short-term problem issues.

We are also a sister agency to the Congressional Research Service, which again focuses on very immediate needs of individual members.

First of all I am the project director of the assessment that we are going to address in the next few minutes. The full study is typical of the products that come out of our agency. It is a document several chapters long entitled "Water Related Technologies for Sustainable Agriculture in U.S. Arid/Semiarid Lands." It was just released by the House Agricultural Committee last Thursday.

You have in front of you the summary of that report which is essentially a repeat of the very first chapter of this full volume. You also have in front of you a one-page OTA report brief which synthesizes the highlights of this study into a shorter version.

The assessment itself was a major undertaking; it took over 2 years to complete. Its focus was on U.S. arid, semiarid lands which are essentially located in the Western United States.

The House Agriculture Committee felt it especially important that western experts and individuals involved either as users or in other dimensions of this topic be associated with this assessment. We did involve some 100 citizens from the Western States in a variety of forms, including advisory panels, work groups, workshops, author groups, and reviewers. Especially important was the information contributed in the form of commissioned papers.

A major part of this study focuses on managing western surface runoff and surface water supplies and reservoirs, and includes assessment of the potentials of western stream forecasting, the principal focus of these hearings.

I would like to highlight just a couple points that are easy to summarize with respect to those aspects of the study.

The study itself is quite comprehensive, and includes technology as well as institutional and socioeconomic issues relating to the management of water in all of its forms throughout the hydrologic cycle.

There are two issues with which I would specifically like to deal, the first being Federal understanding and the quality of information we have with respect to type of decisions Federal agencies can make, this would include data availability.

And the second issue relates to Federal coordination activities, an item which we were discussing just a minute ago.

Other witnesses are dealing with specifics. We again did not address and analyze the specific incident of this past year. I would like to bring out more of the generic problems that are reflected by this incident.

First with respect to the adequacy of information, a variety of approaches to forecast runoff from precipitation and melting snowpacks has been developed, and it was the finding of the OTA study after reviewing considerable data and working with a number of experts that all approaches could benefit by an improved understanding of the highly complex hydrologic processes involved in western river systems.

Surprisingly, we get a tremendous—as you have already heard today—a substantial amount of the surface water supply comes from mountain snowpack, and still OTA found that very little research attention is actually focused on the mountain snowpack itself.

Now you have heard discussions in the other two panels, concerning the variety of models and different data bases that are used to make forecast projections. If we look at a model as it basically deals with interrelationships among components of a system and as we are addressing models today, it could be defined as a simple series of equations that express such relationships in mathematical forms.

You have also heard that a model is only as good as its assumptions, and clearly we find that the model is only as good as its data. There is a tremendous amount of activity in data collection within the Federal Government. The process of analyzing and combining that data and sometimes having compatible data is a little more difficult to get a handle on, and in fact does perhaps create situations where different agencies have different models with different data that may not always be compatible, or may in some cases create some confusion.

Simulation models, in particular those that are used in flood forecasting, are generally data intensive and require very experienced users for successful implementation.

In addition, in the West as already has been inferred, we have just as a natural process a tremendous variability in climate. I have included in the back of my testimony a simple figure. This is from the U.S. Geological Survey, showing that fluctuation of the Colorado River flow volume is significant, varying as much as 10 times during 1 year or between 2 succeeding years. If you look at that figure, it does reflect that there is quite a bit of natural variability which we have to look at if we are planning, especially long-term management of river systems.

Then again the research focus of the snowpack which is such a major contributor is weak and certainly could be improved in such systems as the Colorado.

Now, a separate issue, dam safety, relates to what you have talked about this morning that we looked at very briefly in the assessment. And that is certainly an issue brought up again in this past summer's floods.

Dams and reservoirs in the Western States became practical in the early part of the 1900's. Previous water planners have focused on project construction, not operation and maintenance.

Many expenditures to insure the safety and efficient management of all facilities have been postponed and we are hearing now that major construction work and expenditures are required.

According to recent GAO figures, the cost of these repairs could reach several billion dollars, and this together with the problem we have of trying to understand the system and to do better data synthesis I think are major factors that need to be taken into account in fundamental water policy in the West.

The second question that I want to address is the adequacy of Federal coordination. This issue flows naturally from what I said, that our stream forecasting has been undertaken seriously for several years but responsibility for runoff forecasting is dispersed among a number of agencies and to some degree each has developed its own approach.

Each agency has a line item in the budget, each has a separate mandate, and sometimes each agency's data needs to be fine-tuned. So in part, this may be one explanation to help us better understand the dilemma we are in.

At the same time I think the focus on long-term management could be improved, which probably as it has been a bit less of a strong item for attention in the past, may be a reason why we have not worked together so well as Federal agencies.

Now, I want to show you a number of items that have come up this morning relating to competing uses. It seems one person will say we have to worry about hydroelectric generation, another will say farming, and a third will emphasize instream flow for recreational purposes.

I think one of the biggest problems that we identified in the assessment is the increasing competition on these rivers and increasing pressure coming upon agencies like the Bureau of Reclamation to manage the river for all of these different needs.

I think that even hydroelectric power as it is increasingly a user that can pay more for the water will be an increasingly powerful and important factor in how water is released. And if you are always planning for the peak, you may, based upon that need, want more water in that reservoir.

One finding that came out quite strong in terms of agriculture in the West for purposes of conservation, for example, is that one way to conserve water for a farmer is to improve delivery systems and especially the flexibility with which water can be delivered to the farm.

With that opportunity for conservation, because water costs may fluctuate and in some cases may drop, we found there's likely to be increased demand from farmers and water districts to participate in decisions on how water is released from reservoirs. That is going to be one more level of sophisticated demand that is going to be placed on the Bureau of Reclamation in the future with respect to how it satisfies all the competing needs.

Now I would like to quickly summarize the points that I very briefly identified by putting them in the form of four findings that came out of the assessment.

First of all, the evaluation of any technology designed to forecast precipitation and/or runoff from the western hydrologic environment and especially from the Colorado River system's complicated hydrologic system would benefit from a more integrated approach to the study of hydrologic projects than that which exists. This means also getting agencies together which are working on different parts of this system.

If you have SCS in snowpack; Bureau of Reclamation in the river reservoir; USDA on the fields; the Forest Service in the mountains looking at the Alpine and cutting down and planting trees, working with snowpack management; and the Weather Service over here doing something else—if we are looking at weather as it is actually operating, it's a natural cycle and we will have to begin to work in managing that national resource in a more systematic, holistic way.

It should be reflected in the fact that most of the runoff comes from the mountain snowpack, an area which certainly needs increased research attention for terms of managing western supplies.

We found water supply forecasting technologies to be one of the most promising areas and also one that over the long range has a tremendous amount of economic benefit to it.

A wide range of forecasting models, as you have already discussed today, and the research that we could collect indicate that no single forecast model will be sufficient.

Any model or technology should be tailored to the characteristics of the watershed and agency approaches which attempt to generalize or extrapolate from other sites may not adequately address the problems of the residents of the particular site.

Water forecasting technologies should form the foundation of water management and planning in the West and, as such, resonsible agencies, especially at the Federal level should be encouraged to evaluate existing forecast systems more effectively and critically, develop more detailed study of the processes involved with snow accumulation, melt runoff from the highland watersheds, and improve coordination efforts with those involved in various aspects of watershed and downstream site planning management.

We developed a number of options for Congress that were broad based and really focused on this need.

One that does relate to one of the prior panels was our option that a national center for water resources research be established by Congress to unite the multiplicity of university and private sector research efforts in water. And certainly that option has some applicability to the discussion that we had in an earlier panel about the need for scientific expert panels that can evaluate government federal plans and operational techniques.

Thank you.

[The prepared statement of Barbara J. Lausche follows:]

TESTIMONY OF BARBARA J. LAUSCHE

PROJECT DIRECTOR, FOOD AND RENEWABLE RESOURCES PROGRAM

OFFICE OF TECHNOLOGY ASSESSMENT

BEFORE THE SUBCOMMITTEE ON INVESTIGATIONS AND OVERSIGHT

OF THE HOUSE COMMITTEE ON SCIENCE AND TECHNOLOGY

Federal Management of Western River Systems

October 14, 1983

Mr. Chairman, thank you for your kind invitation to participate in this hearing. I would like offer some of the relevant findings of an OTA study related to this topic and released just last week, and conclude with a summary of some of the broad policy issues identified in that study which Congress might address to improve management of Western rivers and their floodplains.

As the Subcommittee is aware, the Office of Technology Assessment (OTA) is a nonpartisan analytical support agency that serves the U.S. Congress. Its purpose is to help Congress deal with the increasingly complex and highly technical issues that confront our society. Its specific mandate is to address long-term implications of technology in major problem areas as requested by Congress. I am the Project Director for OTA's assessment: "Water-Related Technologies for Sustainable Agriculture in U.S. Arid/Semiarid Lands."

This assessment was requested by the U.S. House of Representatives, Committee on Agriculture. Its subject is the long-term impacts and potentials of technology in water use and arid/semiarid agriculture and encompasses a number of broad and long-term topics related to the effective management of Western water supplies. The assessment process involved the input of over 100 technical experts from the seventeen Western states in an advisory panel, workgroups, workshops, and as authors of background papers and reviewers of drafts.

A major portion of the OTA study is devoted to managing western runoff and surface water supplies in reservoirs, and includes assessments of the potentials of Western streamflow forecasting, a principal consideration of these hearings. If effective measures are to be designed to minimize the possibility of such floods as that which occurred this summer, we need to learn from the specifics of this tragic event and also from the broader issues raised by this event for Western water supply and floodplain management. Some of the findings of the OTA assessment are relevant to the broad, long-term issues underlying the lower Colorado River flooding. These issues with which my testimony will deal relate to the adequacy of:

1) Federal understanding and information about the natural and intervening processes controlling snow accumulation, melt, and runoff from highland watershed supplying Western river flows, and
2) Federal coordination of activities involved with data collection, runoff forecasting, and management of Western river flows to meet the growing demands being place on Western systems.

Other witnesses here today are more qualified to address particular details of the day-to-day operations of the Colorado River system as they occurred during this summer's flood.

Adequacy of Information about Natural Processes Involved

A variety of approaches to forecast runoff from precipitation and melting mountain snowpacks have been developed by Federal and State agencies responsible for various aspects of water resource development or management in the West. Particularly for management of such systems as the Colorado River, the OTA assessment found that all approaches would benefit from an increased understanding of the highly-complex highland watershed environment involved.

Two broad categories of streamflow-forecasting exist. Some technologies forecast runoff resulting from rainfall; this method has been developed primarily for the rainfall-abundant Eastern U.S. Other technologies forecast spring snowmelt runoff from mountain watersheds. These technologies are particularly important in the Western United States in light of the major role of the mountain snowpack in meeting Western water demands. They involve an evaluation of the amount of snow present each spring at the beginning of the melt season, how the snow melts, and the way it enters the river system.

A variety of models have been developed to anticipate the timing and volume of precipitation runoff into reservoirs so that release can be scheduled to meet identified demands and priorities. A 1982 OTA study of water resources models assessed this Nation's ability to use models to more efficiently and effectively analyze and solve our water resource problems. As explained in that assessment:

> "Models deal with the interrelationships among the components of a system. For example, the decision to store water behind a dam will increase (or maintain) the size of a lake behind the dam, and decrease the amount of water flowing below the dam and the amount of electricity generated at the site. The action may increase the number of fish in the lake, attracting more fishing enthusiasts, and reduce the level of water in a marsh downstream, inducing birds and other wildlife to migrate elsewhere. Models are simply series of equations that express such relationships in mathematical form." (OTA assessment: Use of Models for Water Resources Management,

Planning, and Policy, OTA-O-159, August 1982, p. 27)

To use models effectively for Western water management, reliable data and an understanding of the hydrologic processes are essential prerequisites. Simulation models (those that attempt to simulate the snowmelt process and have been commonly used in flood forecasting) are generally data-intensive and require an experienced user for successful implementation. Moreover, the basic hydrologic processes involved are complex. Understanding hydrologic interactions for management and forecasting of systems such as the Colorado River is particularly complicated because of the annual and seasonal variability in streamflow volume. The fluctuation of the Colorado river flows is significant, often varying by as much as 10 times during a year or during 2 succeeding years (figure 1). In addition, the most important source of renewable surface water supplies for the Colorado system is the mountain snowpack. Yet, relatively little research attention has been given to the operation of the snowpack as it accumulates, melts, and runs off the highland watersheds.

The OTA study found that at present the study of Western hydrologic regimes is fragmented and incomplete. The Colorado system typifies this fragmentation where, for purposes of Federal water-project development, water management and data collection, the upper Colorado is distinquished from the lower Colorado even though they are hydrologically one unit.

A separate but related water management issue raised by this summer's floods for river systems such as the Colorado is the question of dam safety as extremely wet years place increased pressure on existing reservoir storage systems. The majority of dams and reservoirs in many Western States became operational in the early part of the 1900's. Because previous water planners focused on project construction, not operation and maintenance, many expenditures to ensure the safety and efficient management of old facilities have been postponed. According to a recent General Accounting Office study, the cost of these repairs could reach several billion dollars; nevertheless maintenance and repair issues will need to be addressed in order to mimimize future hazards for floodplain areas.

Adequacy of Federal Coordination

Streamflow forecasting has been undertaken seriously for approximately the past 30 years. Responsibilities for runoff forecasting are dispersed among several Federal agencies, and, to some extent, each has developed its own approach. Forecasting in the Western United States for either internal agency use or public dissemination to improve regulation of reservoirs that control the surface flow of Western rivers currently involves several Federal agencies and at least one State agency (California). These efforts sometimes are not coordinated and include aspects of duplication and inconsistency.

Generally across the Western States, responsibilities for water-related data collection, analysis, dissemination of information based on these data, and planning are scattered widely among a number of Federal and State agencies (table 1). Furthermore, among Federal agencies the lack of a single coordinated mechanism for data collection and analysis has produced a number of data bases and intepretations with varying degrees of compatibility.

A more coordinated approach to the study and management of highland hydrologic systems of the Colorado and other Western river basins would significantly improve water management and forecasting in the Western United States. As demands on water increase, coordination will become more critical. For example, the OTA study found that in western irrigation agriculture more flexible systems of water release and deliver to the farm may have potential to conserve water. In the future, farmers and water districts are likely to seek an increased role in decisions regarding the timing and amount of water released from storage facilities in order obtain this flexibility.

Improved coordination of water management activities throughout the river system will be a key factor in helping meet these kinds of increasingly sophisticated demands. Ideally, the goal of this effort would be the development of an ability to trace the path and history of water from the time it originates as precipitation in a winter storm through deposition, melt, and ultimate runoff into either the rivers or reservoirs of the region, and evapotranspiration or percolation to ground water.

Summary of Policy Findings of OTA Assessment of Particular Relevance to Issues of This Hearing

Without increased Federal and State attention to western river systems management, it can be anticipated that situations such as that which occurred this summer with the Colorado River floods will reoccur in the future because of the complexity and variability of hydrologic processes, growing and competing water demands throughout the system, and fragmentation of existing management approaches. The OTA assessment on water and Western agriculture identified a number of areas appropriate for congressional attention to address these problems including the following:

- o Evaluation of any technology designed to forecast precipitation and/or runoff from hydrologic environments in the West (and specifically in the Colorado River system) would benefit from a more integrated approach to the study of the hydrologic processes than that which now exists.

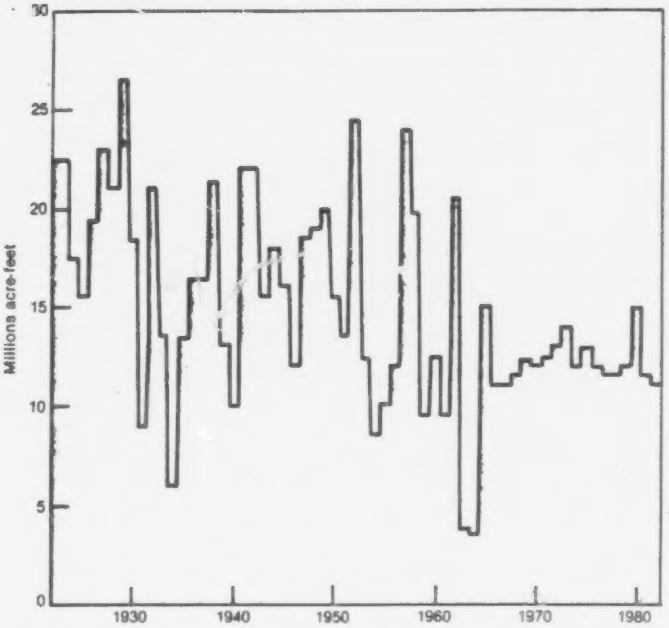
Hydrologic research activities and priorities should reflect the fact that most of the annual surface runoff in the West comes from the mountain snowpack, an area which needs increased research attention for purposes of managing Western water supplies in the most effective manner.

Water-supply forecasting is one of the most important technologies related to precipitation and runoff in the Western United States for long-term economic development. A wide range of forecast models exists and research indicates that no single forecast model may be sufficient for all the hydrometeorological environments in the West. Any model or technology should be tailored to the needs of the particular watershed and agency approaches which attempt to generalize or extrapolate from other sites may not adequately address the needs of the residents of the watershed.

Water-supply forecasting technologies should form the foundation of water management and planning in the Western United States. As such, responsible Federal agencies should be encouraged to evaluate critically the existing forecast systems, develop a more detailed study of the processes controlling snow accumulation, melt, and runoff from highland watersheds, and improve coordination of efforts with those involved in other aspects of watershed and downstream floodplain management.

Figure 1 —The Annual Variability of Steamflow Volume, Upper Colorado River, 1920-80

The year-to-year variability of most Western rivers is high, as typified by the Upper Colorado River. Where water is allocated on the basis of some long-term mean-flow volume, there will be insufficient water to meet that allocation during many years. The decreased variability of the Colorado River shown on this figure beginning in the mid-1960's results from the construction of dams and reservoirs.



SOURCE: Office of Technology Assessment, compiled from National Water Data Exchange (NAWDEX), U.S. Geological Survey, 1983.

Table 1 —Federal Water-Data Collection Agencies[a]

In-house data programs	Government agencies						Independent agencies			
	USDA	DOC	DOD	DOE	DOI	DOT	EPA	IBWC	NRC	TVA
Surface water	X	X	X	X	X	X	X	X	—	X
Ground water	X	—	X	X	X	X	X	X	—	X
Water quality	X	X	X	X	X	X	X	X	—	X
Water use	X	X	X	X	X	—	—	—	—	—
Environmental impact	X	—	X	X	X	X	X	—	—	X
Ecology	X	—	X	X	X	X	X	—	—	X
Management effects	X	—	X	X	X	X	X	—	—	X
Basin studies	X	—	—	—	X	X	X	—	—	X
Real-time sensing	X	X	X	—	X	X	—	—	X	
Remote sensing	X	X	X	—	—	X	X	—	—	X
Data sensing	X	—	X	X	X	—	X	—	—	X
Instream use	X	—	—	—	X	—	—	—	—	—
Water rights	X	—	—	—	X	—	—	—	—	—
Floods	—	X	—	—	X	X	—	—	—	X
Energy	—	—	—	X	X	—	—	—	X	—
Nuclear	—	—	—	X	X	—	X	—	X	—
Precipitation quality	—	—	—	—	X	—	X	—	—	X

KEY: USDA—U.S. Department of Agriculture; DOC—Department of Commerce; DOD—Department of Defense; DOE—Department of Energy; DOI—Department of the Interior; DOT—Department of Transportation; Independent agencies: EPA—Environmental Protection Agency; IBWC—International Boundary & Water Commission; NRC—Nuclear Regulatory Commission; TVA—Tennessee Valley Authority.

[a] For the 1981-82 fiscal year, 28 Federal agencies, representing six departments and four independent agencies, collected water resource data. These efforts have produced a diffuse data base, confused agency responsibilities for water measurements, and often introduced varying data collection techniques which produce data incompatibility.

SOURCE: U.S. Department of the Interior, Geological Survey, Office of Water Data Collection, *Plans for Water Data Acquisition by Federal Agencies Through Fiscal Year 1983* (Reston, Va.: 1982), p. 7.

Mr. **Reid**. Your testimony was excellent. I have a couple questions.

You made an observation which I think is interesting, that hasn't been mentioned enough in all the testimony we have had here and in California and in Arizona, that in effect, there are lots of agencies that are responsible for forecasting flows along the Colorado River, not just one.

There are, of course, a bundle of agencies that have some responsibility for managing it also. If we look nationwide at river forecasting and management, the list gets even bigger. Is it your opinion that these agencies work well together, or don't work well together?

Ms. **Lausche**. I'm going to answer this one really in the form of my opinion because it was—we did not as an assessment——

Mr. **Reid**. Your opinion is fine.

Ms. **Lausche** [continuing]. Evaluate specific program operations. I think that there's a good amount of improvement potential. Let me give you an example, I was at a meeting——

Mr. **Reid**. That's why you went to law school, right?

Ms. **Lausche**. Well, now it's useful, right.

Let me give you an example of a press conference I attended in Washington when the Department of the Interior made an announcement that it was going to change its system of water analysis and produce the annual water assessments instead of these major lengthy documents that come every 10 years. The effort as it was announced was going to be spearheaded by the U.S. Geologic Survey which would take, as was expected, data from different agencies that were collected and used for different purposes, assimilate and synthesize the data for annual analysis of what was happening in water.

Now at the time of that press conference, which was March of 1983, there were no conferences to work across agencies, so a few of the people in the audience who were from other Federal agencies said:

How are we supposed to do this?

We are understaffed, we are having trouble even synthesizing our own data for our own purposes, and now are you going to call us up and say that in addition you would like us to synthesize or reshuffle or provide data for your particular purpose?

Is there going to be an opportunity where we can do some cost-sharing and budgetary problem type sharing of this sort of thing? And there was nothing available in terms of the financial support. The staff supported the need to do that.

I think Federal agencies themselves are increasingly recognizing the need for interaction and are just so strapped for time and staff and funds themselves that they have a very hard time doing it except in a crisis like what happened this summer. Then they get together, then they can respond quickly.

Mr. **Reid**. What changes would you suggest, other than having crises all the time, to establish better teamwork among these agencies?

Ms. **Lausche**. One thing I think that came out pretty strong, an assessment such as the one we just finished is needed for longer term plans that really could take into account the historical data and the mix of players involved plus perhaps in some sense a more realistic and futuristic review of what our institutional and legal opportunities are.

I was quite impressed. I saw how Western States are trying to grasp this problem and how much they would like to move forward if they could trust the scientific information they are getting from the Federal Government.

Mr. **Reid**. Congressman Nielson.

Before you start I want to make this water related technology summary part of our record. Without objection that will be the order.

Ms. **Lausche**. Very good. Thank you.

Mr. **Nielson**. You mentioned there was not enough attention paid to snowpack. Do you agree with Mr. Patefield's statement when he said snowpack works very well during this period; do you agree with that statement?

Ms. **Lausche**. I do not have the specific information, we didn't analyze a specific time.

Mr. **Nielson**. You said there's not enough attention paid to snowpack. He indicated that it worked very well during that period. Who is right?

Ms. **Lausche**. My statement is more in the longer term contacts of western river management in general. My research focuses very weakly in the Alpine and your mountain zone. It is the weakest research area.

Mr. **Nielson**. You don't dispute his statement?

Ms. **Lausche**. No, I don't dispute it.

Mr. **Nielson**. What is your opinion as to why that information was not used by the Weather Service sufficiently to give the Bureau important information?

Ms. **Lausche**. I can only conjecture that there may not be the formal links. As a general problem, Federal agencies sometimes have either their own data which they feel is more complete, or if they do share data they use it in a manipulative way only using part of it. I could not go beyond that in this instance.

Mr. **Nielson**. I'm following up on the question Congressman Reid asked. You have the Weather Service in the Department of Commerce, Soil Conservation in the Department of Agriculture, and you have the Bureau of Reclamation in the Interior and other aspects of flood control in the Interior. Yet it's a common problem, you yourself said. We have to balance the agriculture, the flood control, the recreation and have the Department of Energy involved also.

What can be done to bring all those people together in a centralized unit so data is collected where it's needed and used throughout the system so we have good—I don't blame the Bureau at all, I think they have an almost impossible task.

If I was rough on them earlier, it was simply because they cannot take care of all of these diverse needs properly unless they get cooperation from the Department of Commerce and Department of Agriculture.

Ms. **Lausche**. First of all, I agree the Bureau has a difficult job and we will probably have problems like this coming up again. It's not only Federal agencies in which we have this dichotomy and split in problem activities; it's one the Congress and specific committees address the needs and the issues and the oversight questions of the specific agency.

We made an attempt in the assessment to come to grips with that by posing the possibility that we could start with just the question of data synthesis. We have data coming out of our ears.

If we only knew what it meant for the specific district in a certain area of Colorado when they need it.

Mr. **Nielson**. I got the impression from Mr. Broadbent's comments this morning that they would like to have good information, they'd like to put in their computer model and be able to predict these things better and balance these various competing uses for our water. So I think they are willing.

I made a somewhat facetious statement about transferring Soil Conservation Service over to Interior and I might make the same suggestion, transferring them from Commerce to the Interior.

I think we all need to be in the same agency to get coordination.

Ms. **Lausche**. Perhaps if you want to focus on resource water, let's move all our agencies into a new agency called Water.

Mr. **Nielson**. I don't want another department.

Ms. **Lausche**. That is the problem you have got, the political links right now. Remember the proposal for a Department of Natural Resources some years ago, how difficult that was. It may not have been a valid proposal but at the same time it illustrates the difficulty of shuffling once one's territories are established.

One of the things that the OTA assessment advisory panel seemed to support was, first of all, the need for some synthesizing unit. Let's call it the Office of Water Resource Analysis or something similar and have the specific focus of that unit to be tried as synthesized data.

Now there is another possibility when you're talking about specific things like models for the Bureau of Reclamation. OTA a while back did an assessment of water models across the Nation and they found that first of all there was not enough money going into any one agency, so each one would go up so far, no one would get to the point where they were fully capable of doing these broad-based things that they needed because the money was spread around too many places.

Now maybe you have a centralized unit within the Government. Now we are getting sophisticated. This is the information age, we now have a main frame computer greater than what they have in California, somebody focuses it on the Federal resource issues.

Technology, that might be one opportunity; you'd have to decide where it should go, but I think the data synthesis capability may be in the executive branch or legislative.

Mr. **Nielson**. Let me be more specific. OTA makes streamflow estimates. Then you said that responsibility for using this information was highly dispersed among a lot of different agencies—you indicated the Forest Service because they were in the Alpine aspect.

If you make the streamflow, couldn't you go directly to the Bureau of Reclamation with those streamflows and bypass these other agencies? Couldn'x you do that directly?

Why do you have to depend on all the other intermediate places to get that information down to the Bureau of Reclamation?

Couldn't you act directly with the Bureau of Reclamation, give your streamflow estimates directly to them to start with?

Ms. **Lausche**. Who would be doing those streamflow estimates?

Mr. **Nielson**. You said OTA makes them.

Ms. **Lausche**. Oh, no, I am sorry. I was mistaken then.

Mr. **Nielson**. Who does make streamflow estimates?

Ms. **Lausche**. Well, operational estimates, you know, we already had the testimony of a number of people here, agencies represented that make these operational estimates.

Mr. **Reid**. Lots of people do it, don't they?

Ms. **Lausche**. We did identify during the assessment that a considerable amount of private sector folks are being hired by cities in the West to do this.

Mr. **Nielson**. When you have the Colorado River system which goes from a low of 5 million acre-feet to 25 million acre-feet this year, and you try and balance to have enough to take care of the agricultural needs, and yet not have so much in it that you have flood control problems, how would you suggest we cover these extremes?

Ms. **Lausche**. I think that is almost purely policy decision. Policymakers are going to have to decide whether they are planning for those extreme flood years and the damage that's caused there or whether they are managing for the extreme dry years and the amount of water demands that are there, or whether there's some meaning and if there's going to be slippage either way. Clearly I agree with you, Congressman Reid, there's a tremendous amount we can do in conservation to lessen the damage and the hardship caused during the predicted dry years.

It may be just because of the costs involved with flooding we have to be more concerned about managing for those extreme wet years. I'm not a specialist in this area.

Mr. **Nielson**. Would you suggest we maybe minimize the total damage over all time; in other words, take a middle course where we have a little damage with a dry year and maybe a little damage on 2 wet years? Or would you make your game plan move up and down?

Ms. **Lausche**. I think it needs to be flexible because we have such a variable national system as Professor James mentioned.

If we know we are going to be running for a 2- or 5-year wet period, the probability is high we will need flexibility to do that.

At the same time I'm not so sure that just—I don't know really what normal means in the West anymore because our variability is so extreme and planning for the normal year may cause us a lot of hardship both ways.

Mr. **Nielson**. I am just wondering what your strategy would be if you had the power to handle all this. Would you allow a little bit; in other words, you know, we are going to have trouble during heavy wet years. You know you're going to have trouble on wet years. Would you take a policy which plays against say the middle to third years and kind of expect the damage in the other one-sixth on the top end, one-sixth on the bottom end, or rather have a program which completely reverses every few years what you have been doing and causes panic and all sorts of other things.

What is the best strategy?

Ms. LAUSCHE. Why does that cause panic if you reverse it every few years? If it causes panic within the Federal Government, that's their job. If the Government is to be managing a national river system across the boundaries so it has a national jurisdictional aspect, then we need the flexibility to appreciate that water in the West is going to be operating in a variable way and it's the management question, I think, where we have to fine tune our capabilities. Frankly, the assessment finding, and it's not only this assessment, is that management has not been a major focus of many agencies. It's been development.

Mr. NIELSON. Thank you, Mr. Chairman. Thank you for your testimony. It was very interesting.

Mr. REID. One last statement. You know, based on what you have told us, I think that part of the problem could be solved by an Executive order in various areas we have been talking about.

So when the staff prepares this report, one of the places we will have to make sure we send it to is the new Secretary of Interior, because I think he could make some recommendation to the President which would solve a lot of these problems.

Thank you very much.

Ms. LAUSCHE. Yes, thank you very much.

Mr. REID. Do you agree?

Ms. LAUSCHE. Yes.

Mr. REID. Thank you a lot.

The last panel we are going to have today is the U.S. Government representative of the National Weather Service, Dr. Robert Clark, and Dr. McCracken, a representative from the Soil Conservation Service, U.S. Department of Agriculture.

Would you come forward?

While you're coming forward, we have had some great testimony these past few days; however, if I were to give an award, if I had that power, the award would go to our court reporter who has worked tirelessly for 2 days without break, and I want you to know how much we appreciate your patience. We have had court reporters who have thrown tantrums during hearings like this and we're happy that you haven't.

Dr. Clark, Dr. McCracken, if you would introduce yourselves and the people with you, we would appreciate that.

STATEMENTS OF ROBERT CLARK, NATIONAL WEATHER SERVICE, ACCOMPANIED BY MR. BEDKE, DIRECTOR, WESTERN REGION, NATIONAL WEATHER SERVICE; JERRY WILLIAMS, HYDROLOGIST, RIVER FORECAST CENTER, SALT LAKE CITY, UTAH; AND RALPH J. McCRACKEN, DEPUTY CHIEF FOR NATURAL RESOURCE ASSESSMENTS, SOIL CONSERVATION SERVICE, WASHINGTON, D.C., ACCOMPANIED BY MANES BARTON, SCS SNOW SURVEY PROGRAM MANAGER, WESTERN NATIONAL TECHNICAL CENTER, SOIL CONSERVATION SERVICE, PORTLAND, OREG.

Mr. CLARK. I am Bob Clark, Director of Hydrology in the National Weather Service. I have with me Mr. Bedke, spelled B-e-d-k-e, who is the Director of the Western Region of the National Weather Service.

On my left I also have with me Dr. Jerry Williams, who is the hydrologist in charge of the River Forecast Center in Salt Lake City.

Mr. McCRACKEN. I'm Ralph McCracken, Deputy Chief for Natural Resource Assessments for the Soil Conservation Service in Washington, D.C., with administrative responsibilities for among other things the snow survey, the soil survey program, the natural resources inventory and for planning and evaluation.

And I have here with me on my left Manes Barton, who is our Program Manager for snow survey and water supply forecasting, located in our Western National Technical Center in Portland, Oregon.

Mr. REID. Gentlemen, let's have Dr. Robert Clark first testify.

Dr. Clark, we have had the opportunity to review your statement which is very brief and you're welcome to read that if you'd care to, or summarize it if you'd care to.

Mr. CLARK. The statement that I am presenting here today is very similar to the same that I presented before you about 3 weeks ago in both Needles and Yuma. I will elaborate on a few sections, but today I think I will essentially expand some of the work or some of the testimony that I gave at that time, rather than just go through it completely.

Mr. REID. I think Dr. Clark, in anticipating some of the questions we are going to ask, and based upon some of the testimony that's been given prior to your testimony—the reason we saved you until last is to give you an opportunity to respond to the many assertions, statements and observations made about the Weather Service.

Mr. CLARK. Thank you, sir.

I appreciate the opportunity to testify today on the river and flood forecasting program of the National Weather Service and, as you are aware, this past year has been very active both meteorologically and hydrologically. Floods, severe, were observed in every State and this summer we had major drought in the Midwest.

I might just comment that since we had our testimony in Needles, we have had major flooding in Arizona again with damage in excess of $450 million. There have been quite a number of deaths. So this has been a very busy year for us.

The testimony presents some historical background on the program of the National Weather Service. It briefly reviews the 1982–83 season and discusses in a little more detail than I had given in my previous testimony our forecast methodology.

I'm going to skip over the basic mission of the National Weather Service. I might simply point out on the second page that we cooperate, very much contrary to what some people believe.

We cooperate very much with SCS. In fact, Ralph and I probably know each other better than I know my boss. We have coordination meetings very frequently, so we do work very closely with the Soil Conservation Service in the program.

Just very briefly, the River Forecast Center of the Colorado River Basin Center, which is located in Salt Lake City, has been responsible for forecasting the Colorado. It also forecasts quite a number of other rivers in addition to the Colorado. It has responsibility for almost the entire Great Lakes Basin area. They currently have a staff of five people.

I might parenthetically mention the fact we have 13 forecast centers and the average staff of forecasters is from 8 to 12. They vary somewhat in size. We have six or five in the forecast center in Salt Lake City. We have only seven in the forecast center in Videl, La., to forecast the entire lower Mississippi so that our offices are not exactly large.

There is an Interagency Technical Committee on Streamflow Forecasting for the Colorado River system which was established in November 1979. I think we must have had a little foresight; we were going to essentially get into some problems and in fact that committee was brought about by some activity particularly with the Bureau of Reclamation and Soil Conservation Service, and as you will notice in the testimony, this is a cooperative effort. It includes the Weather Service, Bureau of Reclamation, Geological Survey, Corps of Engineers, and I think it's really just in the starting phases. But I believe that as the years progress, we will be able to make some very good progress.

I would like to review rather briefly the 1982–83 forecast problem. We have heard a lot of testimony concerning what the situation was, and what could have been done. Then in hindsight there's always a lot of things that could be done, but let's turn—do you have my testimony, sir?

Mr. Reid. Yes, we do.

Mr. Clark. Would you turn to table 1 which is a variation of seasonal snowpack in the Colorado River Basin, and it presents a little bit of the problem that we encountered this particular year. It's on page 5 of my testimony, Congressman.

To again place it in perspective, the streamflow in the Colorado Basin is divided approximately three-sevenths from the Upper Green, three-sevenths from the Upper Colorado, and one-seventh from the San Juan.

So if you had 7 million acre-feet going to get 3 million acre-feet out of the Green, get 3 million acre-feet out of the Upper Colorado, and get about 1 million out of the San Juan. And that's 7 million acre-feet-is about what the April through July runoff is.

Now this year we started out with fairly heavy snowpack in January, but by February, March, April, and May in the Upper Green, particularly the snowpack decreased considerably.

You will notice it went down from 142 percent of normal to 81 to 80 to 83 and then it went back up to 84.

The Upper Colorado ranged from low of 88 to a high May 1 of 143.

San Juan remained fairly high the entire year.

Now if you sit down and just make some simple calculations like taking three-sevenths of 94 and three-sevenths of 143 and one-seventh of 152, turn out mean snowpack was about 120 percent of normal on May 1.

Actual forecast on May 1 was 117 percent of normal so we were a little bit lower than that but we were not too far off.

The basic problem, of course, is the fact that while there was some very heavy snow and I will acknowledge the fact that certainly in the Sierra Nevadas there was very, very heavy snow, that we did draw down the reservoirs; I think that Commissioner Broadbent mentioned the fact that that reservoirs were drawn down, the Reclamation and various agencies did draw the reservoirs down. There was some very serious problems along the Wasatch front and we were very cognizant of that.

In fact, Dr. Williams I think spent more time in the Governor's Office in Utah than he spent in our office because of the problem on the Utah Lake and on the Great Salt Lake and a lot of concentration on that during that period.

The actual amount of snow that was in the Green which includes the Juintas and of course in the Upper Green was not as heavy as you might think.

In the Colorado it varied considerably. The real area that was very, very heavy and stayed fairly heavy through the entire year was the San Juan.

Now it only contributes again about one-seventh. There were other mitigating circumstances though that led to some forecasts not being as good as we would like for them to be.

No. 1, May was an extremely heavy precipitation month, 200 percent of normal in May. The temperatures in April and up until about May 15, ranged about 10° to 15° below normal.

About the 15th of May or very close thereabouts, the temperatures increased to about 7 to 10 degrees above normal and the snowpack melted very, very fast.

Second thing that happened, again we didn't really anticipate, was the fact that we got extremely heavy rainfall in the middle of June. It was about the 14th, 15th, and 16th I believe it was of June.

The total amount of water that probably came off at that particular time from that heavy rain was between 1 and 2 million acre-feet.

One and 2-million acre feet normally in a 10 or 20 million acre-foot reservoir is not very much. But in a reservoir already full meant a very serious problem as far as reservoirs are concerned.

Also met a very serious problem as far as forecasts were concerned. On the next page we have a table 2 which shows the Lake Powell seasonal—that's April through July flow—forecasts.

The forecasts were as I say, as I mentioned, were quite good actually as far as runoff was concerned through the 1st of May. The actual stream flow in April—we were very, very close on that—we were actually rather close on the stream flow in May. It's when it came to June that things began to go somewhat awry and, of course, you will notice on the 14th of June before actually it really started raining heavily, we jumped the forecast up considerably.

Then after the very heavy rainfall the middle of June we actually had to jump the forecast up again so that it did go from a low of 96 percent of normal to a high of 210 percent.

The fact that it varied from 6 to 14 million acre-feet created a very serious problem, there's no question.

In the next bottom of the table I have actually listed the observed streamflows. These are cumulative amounts. These are no dealt amounts. These in April were 1.1 acre-feet of flow which was very close to May. There were about 3.23 million acre-feet, which was relatively close, but it was the June forecast that didn't go too well.

Concerning past performance, on page 7 in table 3, we have listed the forecasts that have been prepared over the past 20 years, beginning in 1964 when Lake Powell began to be filled, until 1983.

It's been brought out here several times today that the streamflows have been highly variable in the Colorado River Basin. You will notice actually a low—now this was in April through July, I am sorry, was May through September for 1964 to 1979. May to September—no, not annual flow but you'll notice went from a low of 1.4 million acre-feet in 1977.

I assume the entire year was around 5 million. I have heard that quoted several times today to the high this year of 14 million acre-feet. Again this was in April through July flow.

The forecasts in general over that period have not been too bad. The maximum previous error was in 1973 when we were in error by 2 million acre-feet but you will notice for example that beginning in 1979 we had 300,000 low and then, 500,000 high, so 4 years in a row had excellent forecasts of volume, and then, of course, we came to this year which didn't turn out as well.

But, again, there was no indication in looking at our forecasting procedures, in looking at the snow information that we had, that we were going to be that far off.

Certainly on May 1 and, in fact, I think that if one really looked at May 1 this year, went back and started with everything that we might know that I doubt if we would have changed our May 1 forecast by an appreciable account because we simply did not know we were going to have the kind of May we were going to have; didn't know we were going to have the kind of June we had; didn't know we were going to have the temperature extreme that we had, and it is not—I am not apologizing or trying to make excuses. But I am not sure that we could have improved our forecasts considerably.

Will say this, and I am going to mention our forecast methodology might have been doing a better job day-by-day beginning in May had we had better information and I want to discuss that just in a little more detail concerning our forecast methodology.

The end of the "S" employs both statistical and consumptual or physical model processes to produce the forecast for Lake Powell. Forecasts are made for approximately 80 forecast points in the 112,000 square-mile basin above Lake Powell, and I might mention the fact that about half these forecasts are actually issued by the Soil Conservation Service for some of the small head watersheds and about half of them are issued by us and these are coordinated.

All of these points use two or more independent procedures to produce the best possible volume forecast.

Statistical models used by the NWS are based primarily on historical data from the period 1948 through 1977. We are bringing this up to date as rapidly as we can, but rather tedious process to get the data into the right form.

And, of course, it will be brought up within the next year or two to probably 1980, 1982, but it takes us a little while to bring these things up to date.

This methodology correlates a number of variables to run off and these include precipitation, snowpack, water and so forth. Models are developed for each of the forecast points above Lake Powell.

Every one of the 80 forecast points has a model for it for selected points.

As I have already mentioned, the SCS prepared forecasts in very similar manner.

Prediction for each of these points are then combined to make the Lake Powell forecast. Input data used to develop operational use of the statistical models are obtained from data networks with a monthly reporting frequency, and I want to emphasize we have essentially three kinds of network.

In a sense, they are the same people but they report in different ways. We have about 80 additional courses which are all operated by the Soil Conservation course and Dr. McCracken can discuss that. We have about 140 precipitation stations in that area which are mostly cooperative observers, part of our cooperative observer network, which are people that report monthly.

In addition, there are 60 relatively new Snotel sites which the NWS will incorporate into our statistical procedures as quickly as correlation to the historical records can be derived.

Now currently only have about 5 years of data from these. I would like to direct an impression—I don't know where this was obtained, we do get the Snotel every day. Snotel information is fed through the computer system.

I believe it is in Portland, isn't that correct, and our offices read out from the Snotel data in our river forecast centers in Portland and in Salt Lake City and Sacramento the day every day.

Not only is it read by the offices of river forecast office, but the river services forecast office, the WFSO's like in Phoenix and Reno, Nev., also are able to read out of the Portland's computer the Snotel information.

Now these statistical models are deficient, however, in several aspects. Forecasts are from monthly and seasonal volumes and do not provide day-to-day volumes, and that is a serious problem. Models do a poor job of predicting flows for extreme conditions that they have not been observed historically.

In other words, if it isn't in the data base or in the information it just doesn't do a very good job. Models do not account for large variations from normal in both temperature and precipitation that may occur subsequent the date of the forecast.

In other words, if you make a forecast on the 1st of April and you get unusually heavy precipitation in the forecast, the models just don't account for that very well although we do plug that in and they are not amenable to easily change.

For example, any additional changes in data. Changes in data sites require completely recalibrating the models.

These conceptual models employ observed precipitation and temperature data in a combination of mathematical equation simulating hydrologic processes that produce runoff. The models require estimation of more than 20 parameters and are calibrated to the Colorado River Basin using observed data for a 20-year period, 1948 through 1967.

Again, we will be bringing these up-to-date as we get the information in better form. They use current data such as precipitation, snowpack, air temperature, stream flow and so forth produced daily and what we call kind of tongue-in-cheek ESP forecasts. And the information that is used in these daily forecasts are 35 NWS precipitation gages and the 60 Snotel sites and 60 Snotel sites are used every day.

The 35 NWS precipitation stations are then cooperative observers who mainly call us. We have an 800 line and I guess we do, isn't that right, a WATS line, an 800 line that they call in on and receive the information.

In the spring of 1984, and by March 1984, a new version of our national operational program will be implemented. The NWS data requirements for this program to become operational have been communicated to the Bureau of Reclamation and there was reference to [illegible] earlier today.

Now, the list of stations that was sent to them was a list of stations that are places that we felt are important to have information.

No attempt at that particular time was made to coordinate whether there were gages at these locations or not gages at the locations.

This proposal which would provide a real time information as frequently as hourly has subsequently been referred to the technical committee of the Colorado River Forecasting Service for review and we are very much aware that large number of these gages are within 10 miles or within a mile or something on this site.

However, Dr. Williams heads this committee—in fact, I think Mr. Barton who is sitting here is also a member of this committee—is looking into the location of all of these gages, and there are also two members of the Bureau of Reclamation that will be participating in this committee to determine where these gages should be put, how much automation we really need, and make recommendations and, in fact, at the next meeting of the seven basin commission or whatever they call this Colorado Basin commission, there will be a report to them specifically what the needs that we think are based on our recommendations.

This program will provide short-range stream flow forecasts. Observed stream flow data are used to adjust the simulated stream flows to correct for errors which may have resulted from a combination of poor initial conditions, input errors, and so forth.

And I just might mention in addition to automating precipitation stations, we also need to automate a large number of stream flow stations where we can get daily stream flow information so that we can keep our models up-to-date and make sure they are tracking well.

Current conditions of the models are preserved so that they may use as initial conditions for subsequent simulation. Unfortunately, it is not presently possible to develop quantitative instruments of future precipitation and temperature for more than a few days into the future. ESP procedures simulates possible future stream flow using as input current water shed conditions and historical meteorological data.

As I mentioned we have historical data for more than 20 years. Procedure assumes that each day, month or year of historical data could occur with equal probability in the future and simulates a future stream flow trace from each. Normally, at least 10 years of historical data is used in the simulation.

ESP can also use forecast precipitation if we had good forecasts and temperature data when available. The simulated stream flow had been analyzed statistically so that the forecasts are minimal flow, maximum flow of volume and reservoir storage can be expressed problemistically.

The operational implantation of ESP will require supplication of historical records, stream flow, precipitation and Snotel under this for each of the several thousands basins throughout the country. We have about 3,000 basins that we forecast for the United States.

The NWS is working to complete this preparation starting with priority river basins, and I can assure you that one of the high priority river basins will be the Colorado.

A plan to implement ESP over the total Colorado Basin will be available by March of this year. We are putting together a plan for implementation, nevertheless I would like to caution complete implementation will require several years. Rather tedious process to calibrate basins, particularly when you have 20 parameters to work on.

The operational implementation of ESP will provide both short- and long-term stream flow predictions for a wide range. Water managers can investigate various management strategies.

Mr. Chairman, I thank you very much for the opportunity to discuss the river and flood forecasting program and National Weather Service, and I assume that Dr. McCracken will present his testimony next. We will be very happy to answer questions at this time or later.

[The prepared statement of Robert Clark follows:]

STATEMENT OF

ROBERT A. CLARK
NATIONAL WEATHER SERVICE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
U.S. DEPARTMENT OF COMMERCE

before the

COMMITTEE ON SCIENCE AND TECHNOLOGY
HOUSE OF REPRESENTATIVES

October 14, 1983

Mr. Chairman and Members of the Committee:

I appreciate the opportunity to testify today on the River and Flood Forecasting Program of the National Weather Service. As you are aware, this past year has been very active - both meteorologically and hydrologically. Floods, many severe, were observed in every state and this summer major drought occurred in the mid-west.

I will provide some historical background on our program, briefly review the 1982-83 season and discuss in more detail our forecast methodology.

Background

The hydrologic program of the National Weather Service (NWS) has its historical roots in the early development of Federal weather services. The Organic Act of October 1, 1890, assigned to the Weather Service the duties of "... the forecasting of weather, the issue of storm warnings, the display of weather and flood signals for the benefit of agriculture, commerce, and navigation, the gauging and reporting of rivers ..." Today the National Weather Service provides flood warnings for approximately 3000 designated points. At 760 points seasonal volume forecasts also are issued to predict streamflow volumes resulting from mountain snowmelt. These forecasts of runoff volume are issued jointly with the Soil Conservation Service (SCS) usually for the April through July or April through September periods. Forecasts are normally issued once a month from January 1 through May 1.

In general, National Weather Service forecasts are issued for the main rivers and streams where flooding may be critical and information is needed for flood control, irrigation, navigation, recreation, fish and wildlife management, hydro-power generation, industry, pollution control and water supply. The SCS program is limited to smaller headwater streams where irrigation demands for agriculture are important. The NWS makes the Lake Powell inflow forecast on the Colorado River. This forecast incorporates those made by the SCS for the small headwater areas above the Lake. The Colorado Basin River Forecast Center (CBRFC), located in Salt Lake City, Utah, is responsible for producing this forecast, including daily streamflow, extended streamflow prediction (ESP), water supply, recreation and lake elevation forecasts for Utah Lake and the Great Salt Lake. The CBRFC was formally established in 1968 and presently operates with a staff of five.

An Inter-Agency Technical Committee on Streamflow Forecasting for the Colorado River system was established in November, 1979. By Memorandum of Understanding, the Committee formed a joint streamflow forecasting group designated the Colorado River Forecasting Service (CRFS). The goal is to improve streamflow forecast methods and to facilitate data collection and dissemination for the Colorado River system. CRFS is a cooperative effort of six Federal agencies: National Weather Service, Bureau of Reclamation, Geological Survey, Corps of Engineers, Western Area Power Administration and Soil Conservation Service.

1982-83 Forecast Summary

To review the year it is best to consider seasonal precipitation and snowpack and the forecasts issued beginning January 1, 1983. Basinwide precipitation, October through December 1982, was near normal. Although the snowpack in the Colorado River basin was generally above normal, it varied considerably from January to May (see Table 1). The seasonal (April-July) inflow forecast to Lake Powell issued on January 1 was 7.8 million acre feet or 112 percent of normal (see Table 2). This forecast is for the most probable flow, i.e., the runoff which is expected to occur if precipitation after the date of forecast is near normal. In addition, maximum and minimum probable-flow forecasts are also issued, i.e., the flow resulting from subsequent periods of much above or much below normal precipitation. These forecast volumes have a one in ten chance of being exceeded if precipitation is heavy or a nine in ten chance of being exceeded if precipitation is very light.

Because of a decrease in snowpack the forecast inflow was lowered on both February 1 and March 1. Precipitation in March and April was somewhat above normal so that by May 1 the forecast was raised to 8.13 million acre feet or 117 percent of normal. Temperatures during April generally were 10 to 12 °F below normal. As a result, melting which normally starts in April did not occur. On May 15, another analysis was made based on precipitation that occurred during the first half of the month. This resulted in the forecast being increased to 8.33 million acre feet.

The observed precipitation for May was approximately 200 percent of normal. Runoff during April and May was very close to that forecast, however, near the end of May it jumped dramatically. A rapid change to above-normal temperatures (approximately 6 °F above) following almost 2 months of much below-normal temperatures produced unusually large melt. Normal snowmelt losses in early May through evaporation and infiltration into the soil did not occur because of extensive cloud cover, which reduces evaporation, and saturation, snow-covered ground, which reduces infiltration. Snow data on the first of June were very limited and are not generally utilized in adjusting forecasts due to the lack of historical records. Normally most of the snowpack is gone by June 1 and only a few measurements are taken on a regular basis. The June 1 forecast for inflow to Lake Powell was 9.1 million acre feet.

It was evident, when the inflow into Lake Powell did not begin to recede on or about June 7, that the total inflow was going to be more than forecast. Subsequent heavy precipitation in June and an evaluation of runoff and snowpack conditions resulted in the forecast being raised to 11.3 million on June 14, 13.3 million on June 18, and finally 14.6 million on June 28.

A very efficient melt pattern occurred between the end of May through mid-June resulting in a high runoff. Snowpack melt at lower levels, which usually contributes only a small amount to the total runoff through alternating melt, infiltration and evaporation episodes, was delayed and contributed significantly to the runoff. This, coupled with a general rain, produced the exceptionally large runoff.

Table 1. Variation of Seasonal Snow-pack in the Colorado River Basin (percent of normal)

Date	3/7 Upper Green	3/7 Upper Colorado	1/7 San Juan	
1 January	142	120	127	
1 February	81	89	120	
1 March	80	88	114	
1 April	83	114	127	
1 May	94	143	152	128 [illegible] -117

Table 2. Lake Powell Seasonal (April-July)

Inflow Forecast

Average (1963-1977) April-July inflow is 6.95 million acre-feet.

date forecast prepared	April-July inflow (million acre-feet)	percent of average flow
1 January	7.80	112
1 February	7.10	102
1 March	6.70	96
1 April	7.90	114
1 May	8.13	117
15 May	8.33	120
1 June	9.10	131
14 June	11.30	163 ✓
18 June	13.30	190 ✓
28 June	14.60	210 ✓

Cummulative inflow by month
(million acre-feet)

Observed					
Apr	May	June	July	Aug	Sept
1.13	4.36	11.08	14.74	16.10	16.64

Past Performance

During the past 20 years, the difference between the May 1 forecasts for the runoff season and the observed Lake Powell inflow has been less than 1.3 million acre feet in three-fourths of the years. This year the difference was approximately 6.5 million acre feet. Table 2 shows the May 1 forecast and observed inflow for 1964-83.

Table 3. Lake Powell Inflow Forecast and Observation

(million acre-feet)

Year	May 1 Forecast	Observation*	Difference
1983	8.1	14.2	-6.6
1982	8.7	8.2	0.5
1981	2.8	3.1	-0.3
1980	10.8	10.8	0.0
1979	9.1	9.1	0.0
1978	10.2	8.5	1.7
1977	2.3	1.4	0.9
1976	6.7	5.3	1.4
1975	10.5	10.7	-0.2
1974	8.0	6.7	1.3
1973	8.4	11.2	-2.8
1972	6.2	5.7	0.6
1971	7.9	8.1	-0.2
1970	8.0	9.2	-1.2
1969	7.7	7.3	0.4
1968	7.8	8.1	-0.3
1967	6.2	6.4	-0.2
1966	3.6	4.1	-0.5
1965	10.3	12.2	-1.9
1964	5.2	5.9	-0.7

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*Forecast period is April-July for 1980-1983 and May-September for 1964-1979.

Forecast Methodology

Water management information is derived directly and naturally as a result of the NWS flood forecasting program. The need to monitor continuously for floods produces forecasts for periods ranging from one hour to several months. For each type of flood forecast produced there is complementary water management information. Because of this complementary relationship, as improvements are made in the flood forecasting program through automation of data collection and processing, and improved meteorological and hydrological models, information for water management is improved also.

The NWS employs both statistical and conceptual, or physical process, models to produce the forecast inflow to Lake Powell. Forecasts are made for approximately 80 forecast points in the 112,000 square mile basin above Lake Powell. All of these points use two or more independent procedures to produce the best possible volume forecast.

The statistical models used by the NWS are based primarily on historical data from the period 1948-77. This methodology correlates a number of variables to runoff (precipitation, snowpack water-equivalent, areal snow cover and influence of previous years' runoff). The models are developed for each of the forecast points above Lake Powell. For selected points SCS forecasts, prepared in a similar manner, are used. The predictions for each of these points are then combined to prepare the Lake Powell forecast. The input data used in the development and operational use of the statistical models are obtained from a data network with a monthly reporting frequency. These include about 80 snow courses and 140 precipitation stations. In addition, there are 60 relatively new (1978) Snowtel Sites which the NWS will incorporate into the statistical procedures as quickly as correlations to the historical record can be derived. The statistical models are deficient in several aspects:

(1) The forecasts are for monthly or seasonal volumes and do not provide day-to-day values or allow frequent updates.

(2) The models do a poor job of predicting flows for extreme conditions that have not been observed historically.

(3) The models do not account for large variations from normal in both temperature and precipitation that may occur subsequent to the date of the forecast.

(4) Those techniques are not amenable to easy changes (i.e., additional data or changes in data sources require complete recomputation).

The NWS also forecasts the Lake Powell inflow using conceptual models that are part of the National Weather Service River Forecast System (NWSRFS). These conceptual models employ observed precipitation and temperature data in a combination of mathematical equations simulating hydrologic processes that produce runoff. The models require estimation of more than 20 parameters and are calibrated to the Colorado River Basin using observed data for a 20-year period (1948-67). These models use current data (precipitation, snowpack water equivalent, air temperature, streamflow and selected reservoir data) to produce daily and Extended Streamflow Prediction (ESP) forecasts. Daily observations are received from about 35 NWS precipitation gages and 60 Snowtel sites.

In the spring of 1984 a new version of the NWSRFS operational program will be implemented. The NWS data requirements for this program to become operational in the Colorado River basin have been submitted to the U.S. Bureau of Reclamation. This proposal which would provide real-time information as frequently as hourly has subsequently been referred to the technical committee of the Colorado River Forecasting Service for review. This program will generate short-range streamflow forecasts by inputting observed and forecast precipitation and temperature data into conceptual models which simulate streamflow. Observed streamflow data are used to adjust the simulated streamflow to correct for errors which may have resulted from a combination of poor initial conditions, input errors (e.g., incorrect precipitation and temperature data) and model errors. Current conditions of the models are preserved so that they can be used as initial conditions for subsequent simulations.

It is not presently possible to develop quantitative estimates of future precipitation and temperature for more than a few days into the future. The ESP procedure simulates possible future streamflow using as input current watershed conditions and historical meteorological data (e.g., temperature and precipitation) for the period following the forecast date. The procedure assumes that each day, month or year of historical meteorological data could occur with equal probability in the future and simulates a future streamflow trace from each. Normally at least 10 years of historical data are used in the simulation. ESP can also use forecast precipitation and temperature data when available. The simulated streamflow traces are then analyzed statistically, so that forecasts of maximum flow, minimum flow, volume of flow and reservoir stage can be expressed probabilistically.

The operational implementation of ESP will require preparation of historical temperature, precipitation and streamflow data, and calibration of conceptual models for each of several thousand river basins throughout the country. NWS is working to complete this preparation starting with the highest priority river basins. A plan to implement ESP over the total Colorado River basin will be available by March 1984. Nevertheless, complete implementation will require several years.

The operational implementation of ESP will permit the NWS to (1) provide forecast hydrographs for the current 760 water supply forecast points and (2) provide both short-term and long-term streamflow predictions for a wide range of hydrometeorological conditions,so that water managers can investigate various management strategies.

Mr. Chairman thank you for the opportunity to discuss the River and Flood Forecasting Program of the National Weather Service. I will be happy to answer the Committee's questions concerning our program.

Mr. Reid. We do have some questions. Dr. McCracken, I have read your testimony and it is very comparable to that of Dr. Clark in many respects. I would appreciate it, in light of the time problem that we have, if you briefly summarize it so that we can get into the questions.

Mr. McCracken. Mr. Chairman, and Congressman Neilson, I also appreciate the opportunity of appearing before you to describe the role of the Soil Conservation Service in the water supply forecast program for the Colorado River Basin.

You might ask, how did SCS get into this in the first place? This stems from a widespread drought that occurred in 1934 which especially hit the west so that the people out here asked the Department to supply information with respect to water supply which, of course, includes requiring knowledge of snowpack conditions. Therefore, the Department of Agriculture undertook this snow survey and forecasting program at about that time in response to the indicated need.

This program has since been confirmed by authority contained in two broad legislative acts and by departmental regulations which assign this responsibility to SCS.

Now, as part of the snow survey and supply forecasting responsibility which SCS has, we do publish State-by-State monthly water supply and watershed bulletins January through June in 10 western States, including the Colorado basin States. SCS, jointly with the National Weather Service, publishes Western U.S. Water Supply Outlook monthly January through May. This report summarizes the projected stream flow including the Colorado basin.

Groups and agencies having immediate water supply data needs are able to obtain information on a daily basis, as Bob Clark has indicated, through the SCS snow survey data collection computer in Portland, Oreg.

More frequent information is available upon request. Soil Conservation Districts and other agricultural interests who are concerned with water use are among the prime beneficiaries of this particular program. Of course, there are many other users of snow survey information.

Now we need to differentiate here between two types of snow surveying which SCS conducts. One of these has been in use since the snow survey program started in USDA.

This is the program of manual snow course measurements in which snow surveyors visit the sites periodically and take the data, often under extreme conditions and often at great risk.

There are some 1,600 now of these manual snow courses that are separately measured on a regular schedule from January into June each winter. The second type is the automated snow survey program called Snotel, from snow telemetry. Now there are nearly 500 automated SCS Snotel sites in addition to the 1,600 manual sites, and I will discuss these a little later.

Of these, 147 manual snow courses are in the Colorado basin and 78 of the SCS automated Snotel sites are in the Colorado basin above Lake Powell. There are an additional 24 SCS Snotel sites on the Colorado below Lake Powell.

Now, technology for remote sensing of the mountains' snowpack was developed in the early 1960's. By the early 1970's, the SCS has established a network of remote recording stations throughout the Western United States—except California.

In 1975 SCS began implementing the project Snotel which coupled the technology for this automated sensing with meteorburst communication technology. "Meteorburst" takes advantages of ionization of gases in the atmosphere by meteors to carry a signal from the remote site to a central station.

But it is the rapid advance in computer technology, that we are now experiencing which has really been the key in allowing this meteorburst technology and telemetry to be employed in a near real time data acquisition system.

So, as we mentioned, SCS now operates a system of nearly 500 automated Snotel sites which do report daily and can report more frequently than that on demand, in response to signals sent from the central station.

From 3 to 5 years of high quality telemetry data are currently available from this particular system. Although we do plan to discontinue a few of the manual snow courses from which the data do not appear to be highly useful, we do expect to continue quite a substantial number of the manual snow courses. But in the meantime, we will be further developing the automated Snotel system.

We expect to realize a substantial net improvement in the ability to provide both raw data and data analyses to agricultural water managers throughout the West. Now the SCS Snotel system does have substantial capability for expansion, although at present at each site there are only four sensors.

This can be expanded to 16 different types of data that can be remotely sensed at each site, and the number of Snotel active sites can be increased to a total of about 1,000 sites without major enhancement to either hardware or software; in other words, the technology and the hardware that we have can handle a significant number of increased stations.

Due to the nature of this meteorburst technology usage, our automated sites have excellent flexibility for expansion. For example, sites can be operated in virtually all climates and elevation zones.

Now we are developing some second generation enhancement of the automated Snotel equipment. This includes such things as being able to record and send back to the central station maximum/minimum temperature other data for the day, which we do not now have.

In addition there's the Snotel capability of an alarm message to be sent when certain critical events do take place in a particular watershed or mountain basin, such as excessive snowmelt.

For example, at present 16 of these upgraded Snotel sites are installed in the Colorado basin. There is also additional type of technology that's developing which appears to offer additional promise. This is a type of technology in which there can be subsidiary or complementary stations within the vicinity of a particular Snotel site that can receive data about snowpack and other data on a line-of-sight basis from other areas in this immediate basin, a so-called popcorn technology as it's come to be called.

Now daily as has been mentioned, snow and temperature data from 78 Snotel sites in the Colorado basin were available through the Snotel central computer to the National Weather Service, Bureau of Reclamation, Corps of Engineers, and others throughout the period April 1 through July 1, 1983, on a near real time basis.

Comparison of 1983 Snotel data and the remote sensing capabilities for the previous 4 years as you would suspect clearly demonstrates the unusual melt pattern occurring during May and June 1983, for much of the Colorado basin. The 147 manually measured snow courses in the Colorado basin were read on April 1, 1983, and were also read on May 1. A limited number of snow surveys amounting to about 15 percent of the manual snow course network were also measured on May 15 and June 1. So these data, in conjunction with Snotel data, provided clear evidence of the abnormal melt condition that's been described previously. As has been mentioned, additional information may be obtained at any time from the Snotel system in response to critical periods or other special needs.

In summary then, the Soil Conservation Service is continuing to make snow surveys and water supply forecasts and will continue to do so as long as there is public need for this information.

We have moved into a high technology area, installing the 490 automatic Snotel systems and, as I mentioned, 87 of these sites are in the Colorado basin above Lake Powell. This system will eventually greatly reduce the number of costly and sometimes dangerous manual snow survey sites, although we want to reassure people here that we will not discontinue any manual snow survey site unless it is shown not to contribute any significant data and is not of importance to local water users. So SCS has and will continue to coordinate with Federal and State and local agencies in snow pack and water supply data collection analysis and interpretation.

As I think has been brought out in previous testimony no one Government agency could provide all of the data needed to provide timely and accurate information.

Let me pick up on a point that my colleague Bob Clark has made with respect to cooperation with the National Weather Service. In view of our need and our desire for closer cooperation we have just gone through in, the latter part of August, first part of September, a joint meeting of several days in Reno with SCS and NWS middle managers and leaders of our snow survey program in which we worked on closer coordination between the Weather Service's hydrology group and our snow survey-water supply forecasting program. This includes technical coordination; in other words, coordination of our technology, sharing of the data basis and hardware, closer coordination of our forecasts—looking possibly at a common forecast system. Our discussion also included coordination of a greater degree at the policy level and of administrative communication and coordination.

And so we are very enthusiastic and very hopeful about this particular development in interagency coordination. And as Bob has also mentioned, there is this activity of the interagency subcommittee of the Colorado River Forecast Center which is getting together to plan increased coordination. We thank you again for this opportunity of appearing before you today and describing the SCS snow survey system.

[The prepared statement of Mr. McCracken follows:]

October 1983

Soil Conservation Service Testimony Concerning Data Collection Efforts In The Colorado River Watershed

My name is Ralph J. McCracken. I am Deputy Chief for Natural Resource Assessments for the Soil Conservation Service in Washington, D.C. We appreciate the opportunity to testify before this committee concerning the U.S. Department of Agriculture's Snow Survey and Water Supply Forecasting Program.

This Soil Conservation Service (SCS) currently administers a cooperative snow survey and water supply forecast program in the Western States. The legislative authority comes from two broad acts. Section 8 of Reorganization Plan No. IV of 1940 (5 U.S.C. Appendix) provides authority to the Secretary of Agriculture, for conducting snow surveys and related research. The U.S. Department of Agriculture regulations, at Title 7, Code of Federal Regulations §2.62, assigns snow survey and water supply forecasting to the Soil Conservation Service. The Watershed Protection and Flood Prevention Act, Public Law 83-566, as amended, authorizes the Federal Government to provide technical and financial assistance to sponsoring organizations for conservation, development, and disposal of water in watershed areas.

The first snow surveys in the West were made on Mount Rose, outside Reno, Nevada, in 1906. Snow surveys were started in other western states between 1915 and 1928. Program expansion in the 30's was limited, however, because of economic conditions. In 1934, an unprecedented drought struck the United States. The West was particularly hard hit. Western agricultural interests asked the U.S. Department of Agriculture for information, both general and specific, on water supplies for the ensuing growing season. As a result of this request, the Bureau of Agricultural Engineering was assigned the task of surveying snowpack conditions and forecasting irrigation water supplies in 1935. In 1939, the Division of Irrigation of the Bureau of

Agricultural Engineering was transferred to SCS. Following this action and the Reorganization Plan No. IV of 1940, SCS has had the responsibility for making snow surveys and water supply forecasts.

As part of the snow survey and water supply forecasting responsibility, SCS currently publishes state monthly Water Supply Outlook Reports and watershed bulletins, January through June, in 10 western states. These reports and bulletins give over 25,000 individuals and organizations information on streamflow forecasts at some 512 separate gauging points in the Western United States outside California. These forecasts are developed jointly by SCS and the National Weather Service (NWS). Peak flow and low flow forecast analyses on a watershed, river basin, and statewide basis as well as mountain snowpack, monthly and seasonal precipitation, reservoir storage, and soil moisture conditions are included in these documents. Numerous local and regional news releases are developed to publicize anticipated future water supply conditions. These releases are designed primarily for the use of the agricultural community. In addition, weekly reports are issued through the West showing current high elevation snowpack and precipitation data with accompanying hydrologic analyses.

The snow survey program staff prepares and publishes reservoir operation plans for reservoirs constructed with the technical and financial assistance of the U.S. Department of Agriculture, as well as other privately owned and operated water storage facilities who obtain a significant amount of their water from snowmelt runoff.

Snow depth maps, average annual precipitation maps, surface water supply indices, snow load analyses, ski area evaluations, and special hydrologic reports are prepared and published by SCS personnel.

SCS, in cooperation with NWS, publishes a Western United States Water Supply Outlook monthly, January through May. This report summarizes the projected streamflow forecasts, mountain snowpack, precipitation and reservoir storage conditions by major western river basins. This information is provided without cost to those requesting it. Groups and agencies having immediate data needs are able to obtain information on a daily basis through the SCS snow data collection computer in Portland, Oregon. More frequent information is available on request.

Basic data, water supply forecasts, and interpretations are provided to private citizens, irrigation companies, reservoir operators, municipalities, power companies, Federal and state agencies, and many other interested individuals, groups, and agencies.

Soil and water conservation districts and other agricultural interests who are concerned with the delivery and management of surface runoff for the production of food and fiber are the primary beneficiaries of streamflow forecasts and snowpack analyses released by SCS. SCS field office personnel in nearly every county in the West act as local contact points for water supply information. Water supply forecast information issued by SCS is incorporated into both annual and long-term soil conservation district plans to maximize productivity and conserve soil and water resources.

Hikers, campers, fishermen, hunters, skiers, and white water enthusiasts make use of snow survey and water supply forecast information. Structural engineers are interested in the weight of snow for structure design. Fish and wildlife managers use snowpack information to manage wildlife habitats and fisheries.

SCS exchanges data with the Canadian province of British Columbia, Alberta, and Saskatchewan on the watershed areas that include both Canada and the United States.

The modern concept of measuring snow to predict the amount of runoff during the spring and summer snowmelt period was conceived by Dr. James Church, Professor of Classics at the University of Nevada-Reno, in the early 1900's. He devised the sampling equipment that determines the equivalent melted water of the snowpack by weighing snow samples taken at a specific location. This type of snow measurement technique is still employed today. Currently, there are approximately 1600 snow courses measured on on a regular schedule from January into June of each winter. These 1600 snow courses are measured by numerous Federal, state, and private agencies and organizations under the leadership of SCS.

The technology for in situ measurement of remote mountain snowpack water equivalent was developed by SCS in the early 1960's. By the early 1970's, SCS had established a network of remote recording stations throughout the Western U.S. to measure snowpack, precipitation, and temperature using snow pillows, storage rain gauges, and various temperature sensing devices. Data from portions of this network were routinely transmitted by line-of-sight VHF telemetry. In 1975, SCS began implementing a project called SNOTEL (for Snow Telemetry) which coupled the technology for remote automated monitoring systems with meteor burst radio telemetry to enable collection, transmission, and archiving of valuable hydrometeorological data from western mountains. Meteor burst communication technology has been a well known phenomenon for nearly 30 years. Rapid advances in microprocessor technology, however, were the key element which allowed meteor burst telemetry to be employed in a near-real-time data acquisition system. SCS currently operates a network of nearly 500 sites which report daily. From three to five years of high quality telemetered data are currently available from this system. The system is currently operating above a 90 percent level of efficiency in response to nominal polls.

SCS has recently undertaken a series of steps to improve the cost effectiveness of the snow survey and water supply forecasting program. These actions include centralizing data collection and data analyses activities, analyzing the extent to which automated stations can replace manually measured stations, and determining which snow courses are not essential in producing accurate streamflow forecasts. Input has been solicited from users in an effort to insure that their needs are not adversely impacted. SCS believes that the SNOTEL system is a significant improvement over traditional methods of data collection in quantity, quality, and timeliness. Although some snow courses will be discontinued, SCS expects to realize a substantial net improvement in its ability to provide both raw data and streamflow forecast products to water managers through the West. By restructuring this program and streamlining its operations, SCS is attempting to insure its long-term viability in light of budgetary constraints.

The SNOTEL system design provides substantial room for growth. Although four sensors are most commonly telemetered from a SNOTEL site, each has capacity to handle 16 sensors. The current 490 active sites can be increased to a total of 1,000 without major enhancements to either hardware or software. The western two-thirds of the United States, encompassing over 1 million square miles, is within the SNOTEL system's "umbrella" of coverage.

Due to the nature of meteorburst communication, flexibility of the system for expansion is excellent. Sites can be operated in virtually all climates and elevation zones. They can transmit not only regular data, but such measurements as streamflow, reservoir levels, wind speed and direction, soil moisture and temperature, and relative humidity. The SCS has begun monitoring irrigated farmlands as a part of the regionwide effort to reduce salinity in the Colorado River. Second generation SNOTEL equipment has been enhanced to provide for remote site "intelligence" to examine systematically and transmit summary statistics including but not limited to daily maximums, minimums, and average sensor values. In addition, an event reporting feature allows for an alarm message to be sent when predefined critical events, such as excessive rainfall, river rise or snowmelt, occur. This provides an early warning alert capability.

Daily snow water equivalent, precipitation, and temperature data from 78 SNOTEL sites in the basin were available through the SNOTEL central computer to the National Weather Service, U.S. Bureau of Reclamation, and U.S. Army Corps of Engineers throughout the period April 1 to

July 1, 1983, on a near-real-time basis. Comparisons of 1983 SNOTEL snow pillow data with the previous four years clearly demonstrates the unusual snow accumulation and melt pattern during May and June for much of the basin. The 147 manually measured snow courses read on April 1 were also read on May 1. A limited number of surveys amounting to about 15 percent of the snow course network were also measured on May 15 and June 1. These data in conjunction with SNOTEL data provided clear evidence of an abnormal spring snowmelt sequence.

Additional information may be obtained at any time from the SNOTEL system during critical periods and/or in response to special needs. Streamflow forecasts are published monthly along with the snowpack information, from January through May at 89 streamflow forecast points along the Colorado River. Special updates of forecasts are provided under unusual conditions.

In summary, the Soil Conservation Service will continue to make snow surveys and water supply forecasts as long as there is public need for this information. SCS has moved into the "High-Tech" era by installing a 490-site Automatic Data Collection System (SNOTEL) in the West at a cost of nearly $8.5 million. This system will eventually eliminate the costly and sometimes dangerous manual snow survey system. The manual and automatic snow data collection system had sufficient and timely data available to forecast the events that occurred in the Colorado River Basin in the late spring and early summer of 1983.

SCS has and will continue to coordinate with other Federal, state, and local agencies in natural resource data collection analysis and interpretation. No one government agency can provide all the data needed to provide timely and accurate information. We must all work together to give the American taxpayer the best possible information at the least cost.

Mr. REID. Dr. Clark, at the earlier hearing we held there was testimony given then that there was not enough measuring of the snowpack; is that true?

Mr. CLARK. The snow course data as Ralph indicated was read once a month.

Mr. REID. But it's obvious hindsight that it wasn't enough.

Mr. CLARK. That's correct, that probably wasn't enough.

Mr. REID. Let me ask this then. We have gone over the personnel throughout the United States and we only have five people for this area. Would seem to me that you're a little understaffed.

Wouldn't that be a fair statement?

Mr. CLARK. I would say that's a very fair statement.

Mr. REID. The other thing that I gained from the testimony that both of you gave, even though there was not a lot of emphasis put on it by any one of you, obviously you're changing some of the techniques you have used in the past; is that true?

Mr. CLARK. That's correct.

Mr. REID. Would you succinctly tell us what they were? Just tell us in brief laymen's language what changes you're making in weather forecasting in this area?

Mr. CLARK. The primary changes that we are making are development of new models. New models should begin being implemented in March of this year, and this is a much more sophisticated model, but we feel that it will produce better forecasts although I want to say one thing—we are actually using forms of that model at the present time.

In fact, our office in Salt Lake has been using a form of this model at the present time but we should have it completed in time. The unfortunate situation is that one of our biggest problems is getting more information. We are utilizing the Snotel data but I think Ralph said there were 78 stations—I don't remember, I thought there were 60, but you get different numbers at different times. Somewhere between 60 and 78 stations we are using, but in 112,000 square miles that is not adequate.

Mr. REID. Someone told us in previous hearings also that one of the problems we had was that the snow detecting equipment cannot be placed in certain areas; for example, in wilderness areas; is that true?

Mr. CLARK. This is a problem.

Mr. REID. The problem being if you don't have snow detection equipment in areas, it is difficult to determine what the runoff is going to be in any given one time?

Mr. CLARK. This is correct. As you're well aware, the wilderness areas are in high mountains where a lot of snow occurs and it's difficult to get into some of those areas.

Mr. REID. Have you tried working something out so you can put the state-of-the-art snow detection equipment in those areas? The reason I say that, we had testimony before that some of the more archaic, for lack of a better word, snow detection equipment were very large mechanical devices. It's my understanding that some of the new detection and measuring equipment are much more sophisticated and small.

Mr. CLARK. That is correct. Maybe I can let Ralph answer that since he is representing the Department of Agriculture.

Mr. McCracken. Yes, we are employing as we mentioned, new technology including, for example, improved "snow pillows." We are taking steps to provide better protection of equipment.

Mr. Reid. What about in wilderness areas?

Mr. McCracken. We are taking steps to improve protection and are working with more compact and reliable equipment so there will be less visual and physical disruption of designated wilderness areas. We are retrofitting a number of our Snotel stations with new technology.

Mr. Reid. In wilderness areas.

Mr. McCracken. Yes, this would apply to wilderness areas.

Mr. Reid. No problem with installing some of this?

Mr. McCracken. No problem. I'd say the problem is becoming easier and more amenable to solution with the new technology that's coming on. Together with other Federal agencies, we are working with the Forest Service to determine the number and location of additional temporary instrumentation sites that could be located in designated wilderness areas and thereby improve water supply forecasting for the Colorado River Basin.

Mr. Reid. Dr. Clark, at the last hearing we threw around the name of Dino Brugino who was a remote-sensing expert with the CIA and wrote a number of articles. I'm sure you're familiar with him.

What he stated is that the Weather Service could make better use of existing satellite data from NASA and other sources; is that a fair statement?

Mr. Clark. To imply that we are not, is a misstatement, because we are. We utilize the satellite data as extensively as we can. Probably we could use more. I would agree with that.

Mr. Reid. Does the Weather Service agree with the statements that have been made by a number of witnesses, that one of the problems we have is a real lack of coordination of various Federal agencies. The Weather Services, as an example, doesn't have everything at their fingertips and they could use the information, for example, from NASA, Geological Survey, some of the Defense Mapping information within the CIA, local, State and federal agencies. You disagree with that?

Mr. Clark. Yes, sir. If there is anything.

Mr. Reid. Why?

Mr. Clark. The reason is I'm already overcoordinated to death. That isn't to say we couldn't coordinate more, but I have an interagency committee that I deal with.

Mr. Reid. Does this go back to the original problem then, lack of manpower?

Mr. Clark. To a very great extent it is a lack of manpower.

Mr. Reid. People for this whole area, you all work the same shift, do you?

Mr. Clark. Well, what do you mean by that?

Mr. Reid. I mean, five people work from nine to five.

Mr. Clark. Oh, well, it depends. If you have got floods going on they run the station 24 hours a day.

Mr. Reid. With five people makes it a little tough.

Mr. Clark. It is a little bit difficult to put it in perspective. As you're aware we have had floods everywhere this year. The River

Forecast Center in Vydell has six people. So far this year the six people have worked 500 hours apiece in overtime—something like 6 days a month apiece in overtime, because of the floods.

Mr. REID. Of course recognizing efficiencies are cut down and everything.

Mr. CLARK. That's correct, and that's a very difficult problem.

Mr. REID. Well, we do the authorizing for these committees for this agency and I think this is something that next year I'm going to look at very closely, because it seems we are being pound wise and penny foolish in this situation.

I have no further questions.

Congressman Nielson.

Mr. NIELSON. At the risk of asking the same thing a third time, I was fascinated by Dr. Patefield's statement, and I want to return to it again since you are the two agencies concerned with it. He indicated, and both of you also indicated, that he had a lot of information available from Snotel. Yet his statement says that the National Weather Service has reviewed the course of events preceding the high flood flows in Colorado River Basin this year, and their analysis indicates the snowmelt precipitation and temperature data were not available on a timely basis.

Is that an accurate statement?

Mr. CLARK. That is an accurate statement.

Mr. NIELSON. What do you say, Dr. McCracken? Is that an accurate statement?

Mr. MCCRACKEN. Well, I'd say in some respects that is true but I do think we need to make some differentiation here. The Snotel data was available right on through and is available on demand any time.

Mr. NIELSON. Was available on a timely basis?

Mr. MCCRACKEN. Automated Snotel data in my opinion, was.

Mr. NIELSON. If it was available currently why didn't you get it on a timely basis?

Mr. MCCRACKEN. We got it every day.

Mr. NIELSON. This would be a very simple question. It either was there or not.

Mr. MCCRACKEN. Data from approximately 65 stations were available, yes.

Mr. NIELSON. Do you currently have enough different stations?

Mr. CLARK. That's the problem.

Mr. NIELSON. Why didn't he say it that way?

Mr. CLARK. I don't know.

Mr. NIELSON. If it was, why didn't you use it?

Mr. CLARK. We used it. We used it every day. It was cranked into our forecast every day; isn't that correct, Gary?

Mr. NIELSON. I would recommend that you and Mr. Patefield get together and find out what the true facts are. If we have got the data and are not using it, if we don't have good models, if we need additional ones, I'm not sure more money is necessarily the answer.

Mr. CLARK. I agree.

Mr. NIELSON. Let me ask another question.

I made a statement which maybe is presumptuous to Mr. Dozier earlier. I said the obvious weather conditions that existed in the

Utah area, the Wasatch, should that or should that not be a clue as to the problem you're going to have on the other side of the Divide in the Upper Colorado, Upper Green?

Should that or should that not be a clue?

Mr. **Clark**. It certainly was a clue but the problem was the Upper Green covers a very large area and the Wasatch front is not a relatively large area.

Mr. **Nielson**. But if it is a clue, this June forecast of yours which is 6 million acre feet off, should not there have been some alarm bells ringing somewhere along the line earlier than they were? This is very unusual. You go from 14 million to 25 million in 1 year and there should be some indication that's going to happen, that just doesn't occur without someone getting excited and doing something about it very early.

Mr. **Clark**. Jerry was the one that was forecasting. I will let him answer you.

Mr. **Williams**. Congressman Nielson, in Utah we definitely had record precipitation throughout the season. In February and March we had record precipitation.

Mr. **Nielson**. You had it in the San Juan?

Mr. **Williams**. We did, but forecasts in San Juan, in lower Colorado were not that far off. If you check the forecasts of the lower basin, ones that were in the area were from that portion north. Logan River in Utah and Weaver River in Utah had the same precipitation pattern as we got in Green and Upper Colorado.

As of April 1 it was as high as 90, 100 percent if you check the data and yet Logan set a record water river precipitation this year because the precipitation after that time, May, June, July and this was the time that produced a pretty good accumulation of snow and on the Upper Colorado there are still areas with 110 percent of normal precipitation—no, on the Upper Colorado portion, not the Green portion, the Colorado. But the total was like this.

Mr. **Nielson**. I'm sorry to be so critical and persistent on this point, but it just seems like there ought to be a little more statistical correlation on what happens in the Provo area and what happens 55 miles east of there. It seems like there ought to be a little more relationship than you seem to admit.

What kind of model do you have? What statistical model do you have on your forecasting? Do you use the Kramer method? Do you use that method at all?

Mr. **Williams**. No.

Mr. **Nielson**. Why not?

Mr. **Williams**. Because we have been modeling, using the National Weather Service forecast system which includes all different types of models that are available to us, and we use snowmelts and accumulation models developed by the National Weather Service which is a very sophisticated snow accumulation model.

We use that, as Dr. Clark mentioned, for calculating extent of stream flow prediction and it takes everything into account. There's an excess of 40 parameters for calculating snow accumulation and melting snow and calculating precipitation and running it through the soil and downriver channels, and we use the Snotel data from the NWS on the Upper Colorado of all of our daily data that we obtain.

That's why Mr. Patefield's testimony is kind of contradictory to what we actually do. We only have 30 daily precipitation sites now in the Upper Colorado other than Snotel and we use the 78 Snotel on a daily basis. And we only have five real time precipitation stations that give us six hourly data to plug into that forecasting model.

But what you mentioned, if you can correlate from one point to the other, that this is true on many, many cases on a monthly case oftentimes. But, for example, why we are questioning this particular data network that we have here, there are 70 additional precipitation stations.

In September we had enough rain in the Upper Colorado that produced more flow than we got this year and none of that flow came from other Snotel sites. We had flooding all over Arizona last week or 2 weeks ago and none of that came from areas of that Snotel data.

Snotel data from San Francisco where most of that flow came from and points in Arizona—that area for the last 2 years has had record precipitation—and flow from that and up above Farmington and over on the other side of there, Echo Dam was near normal less than 10 miles away. So we need to look at it more in terms of exactly what happened on each point.

But the point you made regarding the fact that there should have been a hint, I think basically could be logical because Utah had very efficient runoff. Great Salt Lake has come up higher than ever before, and it dropped less this season than it ever dropped before in a season.

These two factors alone show deficiencies and we thought all the deficiencies were along the Upper Green and Upper Colorado. This is one of the most efficient years we have had going all the way back to 1920's. We had over 30 percent runoff this year and low evaporation in May and June where everything came off at once.

We had below normal evaporation and if we look at that total 112,000 square miles, when you look at it hydrologically, between 6 and 8,000 feet generally produces very little runoff.

Arizona, Nevada, they only see 5 to 10 percent of runoff in the whole State on the average. Arizona, 7 percent. But this year as near as we can tell—we haven't finished modeling all that—but 6,000 to 8,000 foot belt from during May acted as the 8,000 to 9,000 foot belt because it was cool and precipitation was accumulating. So it was an incredibly efficient and complex year.

Mr. NIELSON. Let me ask you, Dr. Clark and McCracken, in a very short statement because our time is gone, how do you feel our coordination between the Soil Conservation Service through the Weather Service to the Bureau of Reclamation can be improved, so they get the information they have to have in a timely fashion?

I'm not blaming the Bureau of Reclamation, in fact I think they did remarkably well, particularly in the Glen Canyon Dam area which most of you are familiar with. I think they did very well. They did not have enough early warning. How can we improve that system, starting with you and then to the Bureau?

How can we improve that if we have another record year? How can we get the information to them quickly enough so they can react properly, short of moving your department into the Department of Interior?

I was being a little facetious there.

Mr. REID. I can see this great urge to answer first.

Mr. McCRACKEN. I'd say this Colorado River forecast committee approaches a start. We'd like to think between us and hydrology groups and National Weather Service that we made a good start on a dual agency basis. I think it's a matter of agency people getting together and getting to understand each other's programs and their particular objective and their data bases and getting familiar with it.

For example, we welcome the Snotel system. And we have talked to some about having a central weather service and have talked to others about getting better acquainted with Snotel system. We, in turn, need to get better acquainted with the models and modeling approach. So I'd say, more from the standpoint of getting better acquainted with each other's objectives and approaches, that I think that will help us work together better.

Mr. CLARK. Well, I would agree obviously. We have made a lot of attempts to coordinate our activities. I will make one point, that we have different missions to a certain extent and that, of course, prevents the kind of coordination that you'd always like.

Our staffing causes some problems as far as coordination is concerned because of the fact that we are not overly staffed with people. But I think that over the next few years this cooperative effort between the various services through the combined weather forecast center program, through the efforts we are making with Soil Conservation Service—they are now creating a center in Portland which will be located very close to our weather forecast center there—we can develop a better service.

I certainly can't fault the Bureau of Reclamation. By the way, I used to work 13 years for the Bureau of Reclamation, so I have a lot of affinity for that organization. They have been very cooperative.

I have no complaints about cooperation gotten from them.

Mr. NEILSON. Let me thank you both for testifying and also the Bureau and others who have testified earlier and thank you, Congressman Reid, for the invitation.

Mr. REID. Congressman Nielson, you have added a great perspective to these hearings.

One last question. You quoted, Mr. Williams, the LA Times and Washington Post by saying that the Government does not have enough snow and river gages in the Rocky Mountains to predict a sudden and serious snowmelt. Is that a true statement?

Mr. WILLIAMS. I was talking to the fellow that interviewed me and at the time he asked that question——

Mr. REID. It's really late.

Is that true or false.

Mr. WILLIAMS. The data we used late in the season was very limited from May on, very little data. Fifteen percent of the courses are read in May.

Mr. REID. Do you have enough snow gauges in the Rocky Mountains or not?

Mr. WILLIAMS. No, not real time.

Mr. REID. Time is gone. I'd like to say I appreciate all of you being here and I would like to extend my congratulations to the staff for putting together this set of hearings. We've really gained a lot from the testimony.

Not only has the committee gained a lot but I'm sure the region will benefit, and I'm sure that this information which we'll take back to Congress will be used to great effort in the years to come. And I'm looking forward to the final report that will come from the committee.

Thank you.

This meeting now stands adjourned.

[Whereupon, subcommittee was adjourned.]

APPENDIX A

TO BE PRESENTED TO CONGRESSMAN HARRY REID IN OCTOBER 1983

PETITION

We, the undersigned, believe the flood control plan currently in use on Lake Mead and Lake Powell is dangerously insufficient to protect the environmental, recreational and economic well-being of the entire Lower Colorado River Region. We demand that a flood control plan be adopted that will allow the full use of recreational facilities and beaches on all the lakes plus insure the safety of those businesses and individuals located along the Colorado River.

Name WILLIAM T. LIGHTNER
(Please print)
Name William T. Lightner
(Signature)
Address 607 DON VINCIENTE
BOULDER CITY NEV.

Name JOHN OHARA
(Please print)
Name John OHara
(Signature)
Address 520 CRONEY ST.
HENDERSON NEV.

Name Jill Hamm
(Please print)
Name Jill Hamm
(Signature)
Address 937 Major
Henderson, NV 89015

Name SAM C. OWEN
(Please print)
Name Sam C. Owen
(Signature)
Address D-12 Toll Street
Henderson, Nv. 89015

Name John D. Morrow
(Please print)
Name John D. Morrow
(Signature)
Address 721 Kendall
Boulder City, 89005

Name Patricia H. Morrow
(Please print)
Name Patricia H. Morrow
(Signature)
Address 721 Kendall Lane
Boulder City, Nevada 89005

Name Shirley Harrison
(Please print)
Name Shirley Harrison
(Signature)
Address 505 Greenbriar
B.C., Nev. 89005

Name Henry Harrison
(Please print)
Name
(Signature)
Address 505 Greenbriar
B.C., Nev 89005

Name TERRY E. HILL
(Please print)
Name Terry E Hill
(Signature)
Address 511 Yucca Ct.
Boulder City, Nev
89005

Name Richard [illegible]
(Please print)
Name
(Signature)
Address [illegible] Arkansas
Henderson, Nev. 89015

Please mail completed petitions to:

Playmate Resort Marinas
322 Lakeshore Road
Boulder City, Nevada 89005

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Name Bob Baird
(Please print)
Name Bob Baird
(Signature)
Address 311 Sioux Ct.

Name Neal Hanson
(Please print)
Name Neal Hanson
(Signature)
Address 701 Utah

✓ Name DAVID G. BYWATER
(Please print)
Name David G. Bywater
(Signature)
Address 205 WYOMING, Box 902
BOULDER CITY, NV 89005

Name DAVID W. BIRD
(Please print)
Name W. Bird
(Signature)
Address Post Office Box 702
Boulder City NV 89005

✓ Name Peter Matteini
(Please print)
Name Peter Matteini
(Signature)
Address 5099 N D Spencer
LV NV 89109

✓ Name LES STEVENSON
(Please print)
Name Les Stevenson
(Signature)
Address 1446 SAN FELIPE DR
BOULDER CITY NEV.

✓ Name WILLIAM JEAN
(Please print)
Name William Jean
(Signature)
Address 1118 FUENTE WAY
BOULDER CITY NV

Name Kris Granger
(Please print)
Name Kris Granger
(Signature)
Address 311 No. 7th St
LAS VEGAS

✓ Name MARIE WILLIAMS
(Please print)
Name Marie Williams
(Signature)
Address 1001 [illegible] Blvd.
% N. Mercado [illegible]

✓ Name PAUL CHANDLER
(Please print)
Name Paul Chandler
(Signature)
Address 311 YUMA CT
BOULDER CITY NEV 89005

Please mail completed petitions to: Playmate Resort Marinas
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Boulder City, Nevada 89005

TO BE PRESENTED TO CONGRESSMAN HARRY REID IN OCTOBER 1983

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Name [illegible]
(Please print)
Name Don W. Charlston
(Signature)
Address Las Vegas Nev.

✓ Name Teri Lynch
(Please print)
Name Teri LYNCH
(Signature)
Address 500 SHOSHONE Wy.
Boulder City, NV. 89005

✓ Name Tim Stone
(Please print)
Name Tim Stone
(Signature)
Address 886 Del Rey #106
Boulder City, NV 89005

✓ Name F W TOBIN
(Please print)
Name 520 S 13
(Signature)
Address LV Nv 89101
F W Tobin

✓ Name Anthony J. Boswell
(Please print)
Name
(Signature)
Address 3550 Paradise Rd. #347
L.V. Nev. 89109

✓ Name TREVOR D. SCHERRER SR.
(Please print)
Name Trevor D. Scherrer
(Signature)
Address 1216 TIMBER LN
LAS VEGAS, NEV.

Name Kathy Outcalt
✓ (Please print)
Name Kathy Outcalt
(Signature)
Address 1434 Lucky St.
Las Vegas, Nev. 89104

✓ Name Jim Schiller
(Please print)
Name James H Schiller
(Signature)
Address 3256 Atlantic #1
Las Vegas Nev. 89121

✓ Name James A. Long
(Please print)
Name James A. Long
(Signature)
Address 1405 E. Vegas Vy Dr #387
Las Vegas, Nev 89109

Name Paul & Maggie Auld
(Please print)
Name 1286 E. Mojave
(Signature)
Address L. V. N.

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✓ Name DIAN KINNEY
(Please print)
Name Dian Kinney
(Signature)
Address 524 Woodcrest
Boulder City, Nv. 89005

✓ Name CAROL M. PETARRA
(Please print)
Name Carol M. Petarra
(Signature)
Address 3926 S. Perry #B
Las Vegas, NV 89122

✓ Name CHRISTINE M HORNE
(Please print)
Name Christine M Horne
(Signature)
Address 504 BIRCH ST
BOULDER CITY NV 89005

Name BONNIE MUSSELMAN
(Please print)
Name Bonnie Musselman
(Signature)
Address 640 Summerland
Hend. Nv. 89015

Name AJ LONGO
(Please print)
Name A J Longo
(Signature)
Address 4901 Vista Flora Way
Las Vegas

✓ Name TERESA E. FOSTER
(Please print)
Name Teresa E. Foster
(Signature)
Address 1409 Monterey DR
Boulder City NEV 89005

✓ Name George T. [illegible]
(Please print)
Name George T Cross
(Signature)
Address 6003 Vegas Dr.
LV, Nev 89108

✓ Name [illegible]
(Please print)
Name [illegible]
(Signature)
Address [illegible]
[illegible]

✓ Name James Gallaghan
(Please print)
Name [illegible]
(Signature)
Address [illegible] Cloverleaf [illegible]
[illegible] Nev. 89122

Name Jane M Odgers
(Please print)
Name Jane M Odgers
(Signature)
Address 4660 N River Rd sp16
Oceanside CA 92056

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✓ Name PATRICK W. DOWLEN
(Please print)
Name Patrick W. Dowl
(Signature)
Address 7220 JOHN GLENN CIR
LAS VEGAS, NEVADA 89128

✓ Name [illegible] P. PELLICCIONI
(Please print)
Name JOE PELLICCIONI
(Signature)
Address 3672 McKINLEY
L.V. 89121

✓ Name LINDA WYSONG
(Please print)
Name
(Signature)
Address 5676 BIRCHWOOD CIR.
LV 89120

✓ Name GARY WINSCLOW
(Please print)
Name GWinslow
(Signature)
Address 6430 LINDA
LV 89103

✓ Name JAMES R. DEL GIUDICE
(Please print)
Name
(Signature)
Address 7999 RODEO DR
LAS VEGAS NV 89123

✓ Name ~~Robt~~ ROBERT J. LAAS
(Please print)
Name Robert J. Laas
(Signature)
Address 3600 PARADISE RD. APT B-41
LAS VEGAS, NEVADA 89109

Name Henry Rebman Jr
✓ (Please print)
Name Henry Rebman Jr
(Signature)
Address 1295 Shenandoah
Boulder City, Nev. 89005

Name Ed SHAMBAUGH.
(Please print)
Name
(Signature)
Address 8202 E 20Th St.
Downey CA

✓ Name DEL GIUDICE, LUCIAN
(Please print)
Name Lucian Del Giudice
(Signature)
Address 114 [illegible] Wy.
L.V. NV, 89121

✓ Name L. W. Bindrup
(Please print)
Name L. W. Bindrup
(Signature)
Address 4508 EL Campana
Las Vegas, NV. 89121

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✓ Name ANNA C BEEK
(Please print)
Name Anna C Beek
(Signature)
Address 23 Arcade Circle
Las Vegas Nevada 89110

✓ Name MARJORIE CHORN
(Please print)
Name Marjorie Chorn
(Signature)
Address 3108 Ferndale
Las Vegas Nevada 89121

✓ Name [illegible]
(Please print)
Name [illegible]
(Signature)
Address [illegible]
[illegible]

✓ Name FRAN KAZDA
(Please print)
Name Fran Kazda
(Signature)
Address 1467 E Halak Dr #B
Las Vegas NV 89109

✓ Name Linda Mitchum
(Please print)
Name Linda Mitchum
(Signature)
Address 904 Bridgewater #A
Las Vegas NV 89110

✓ Name LELAND PURDY
(Please print)
Name
(Signature)
Address 3180 EL CHICO CT
Las Vegas NV 89120

✓ Name JOYCE STANDISH
(Please print)
Name Joyce Standish
(Signature)
Address 4631 Monterey Cir #3
Las Vegas, NV 89109

✓ Name CHARLES GARZA
(Please print)
Name Charles Garza
(Signature)
Address 6049 MT MCKINLEY
LAS VEGAS, NEV 89115

✓ Name Glenn Lehman
(Please print)
Name Glenn Lehman
(Signature)
Address 113 Fir Street
Henderson, Nevada

Name DON HOLTE
(Please print)
Name Don Holte
(Signature)
Address 28225 JOSEFINA
MISSION VIEJO, CA 92692

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Name WILLIAM H. BARR
(Please print)
Name William H Barr
(Signature)
Address

Name DAVE ESPINOZA
(Please print)
Name David Espinoza
(Signature)
Address 232 MARYVILLE DR.
WALNUT, CA. 91789

Name RICHARD LEA
(Please print)
Name Richard A Lea
(Signature)
Address 18460 DRAGONERA
DR. ROWLAND HGTS CA 91748

Name J.A. CAIN
(Please print)
Name [illegible] A Cain
(Signature)
Address P.O. Box 561
TEMPLE BAR, AZ. 86443

Name William E. Sayles
(Please print)
Name William E. Sayles
(Signature)
Address 656 S. Grade Rd
Alpine Ca 92001

Name Eleanor F. Penwarden
(Please print)
Name Eleanor F Penwarden
(Signature)
Address 737 Isthmus Ct
San Diego, Calif. 92109

Name Phyllis A. Sayles
(Please print)
Name Phyllis A. Sayles
(Signature)
Address 656 S. Grade Rd,
Alpine, Calif. 92001

Name LEROY D. PENWARDEN
(Please print)
Name Leroy D. Penwarden
(Signature)
Address 737 Isthmus Ct.
SAN DIEGO, CAL. 92109

Name Mark Renck
(Please print)
Name MARK RENCK
(Signature)
Address 1752 GLADSTONE
RIVERSIDE CA 92504

Name Lorraine M Richard
(Please print)
Name Lorraine M Richard
(Signature)
Address St Rt 2 Box 975
Cave Creek Az 85331

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Name MARGARET B. KEYWORTH
(Please print)
Name Margaret B Keyworth
(Signature)
Address 5200 Irvine Blvd #62
[illegible] City 92714

Name MARK DAVIS
(Please print)
Name Mark Davis
(Signature)
Address 706 Nevada
Redlands CALIF 92373

Name ROBERT T. HARRINGTON
(Please print)
Name R T Harrington
(Signature)
Address [illegible] LOVERING AVE
FULLERTON, CALIF 92633

Name SHARON VEILLEUX
(Please print)
Name Sharon Veilleux
(Signature)
Address 6461 CASA VERDE DR
CYPRESS CA 90630

Name GARY W VEILLEUX
(Please print)
Name Gary W Veilleux ~~6461 CASA VERDE DR~~
(Signature)
Address 6461 CASE VERDE DR
CYPRESS CA 90630

Name JEROME J Pollock
(Please print)
Name Jerome J Pollock
(Signature)
Address BOX 331 Temple BAR,
ARZ. 86443

✓ Name John & LaJuana HICKEY
(Please print)
Name LaJuana Hickey
(Signature)
Address 3517 Spencer St.
Las Vegas 89109

Name RONALD CUNNINGHAM
(Please print)
Name Ronald Cunningham
(Signature)
Address 321 E. FAIRVIEW #203
GLENDALE CALIF 91207

Name Bob & Laura Marshall
(Please print)
Name 3617 [illegible] Court
(Signature)
Address LV NV 89108

Name MARK Mylius
(Please print)
Name Mark Mylius
(Signature)
Address 410 DRAKE RD
ARCADIA CA 91006

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Name Robin Scott Black
(Please print)
Name Robin S. Black
(Signature)
Address 1100 VIA ZUMAYA
Palos Verdes ESTATES CA 90274

Name Edward Sterling Black
(Please print)
Name Edward S. Black
(Signature)
Address 1100 Via Zumaya
Palos Verdes Estates, Ca 90274

Name Pamela Kukel
(Please print)
Name Pamela Kukel
(Signature)
Address 30605 Rue Langlois
RPV ca.

Name Shelly Norm
(Please print)
Name
(Signature)
Address 30605 Rue langlois
RPV ca

Name TED VERDONE
(Please print)
Name Theodore Verdone
(Signature)
Address 4846 OCANA
LAKEWOOD CA. 90713

Name RON PELHAM
(Please print)
Name Ron Pelham
(Signature)
Address 544 Valmont Dr
Monrovia 91016. Calif.

Name TERRY VAN WOENSEL
(Please print)
Name Terry VanWoensel
(Signature)
Address 12717½ WEDDINGTON ST
No Hollywood Calif 91607

Name THOMAS R. Campbell
(Please print)
Name Thom R Campbell
(Signature)
Address 9987 Whitewood
Cucamonga, CA 91730

Name George C. [illegible]
(Please print)
Name
(Signature)
Address 3923 [illegible]
Chino, Ca. 91710

Name William A. KEYWORTH
(Please print)
Name William A Keyworth
(Signature)
Address 5200 Irvine Blvd, 62
IRVINE, CAL. 92714

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Name Nick MORALES
(Please print)
Name
(Signature)
Address 933 N ADALER DR
Montebello Calif 90640

Name David Briscoe
(Please print)
Name
(Signature)
Address [illegible] Seashore
Newport Bch CA [illegible]

Name Steve Meier
(Please print)
Name
(Signature)
Address P.O. Box 4921
Canyon Lake, Ca. 92380

Name Mark Lemke
(Please print)
Name Mark Lemke
(Signature)
Address Temple Bar Az.

Name Ron Sommers
(Please print)
Name Ron SOMMERS
(Signature)
Address 535 POPLAR
BREA CALIF

Name GENE R BLACK
(Please print)
Name Gene R. Black
(Signature)
Address 1100 VIA ZUMAYA
Palos Verdes Est., CA 90274

Name WILLIAM HARDY
(Please print)
Name William Hardy
(Signature)
Address Box 504
Temple Bar, Ariz. 86443

Name MAXINE HARDY
(Please print)
Name Maxine Hardy
(Signature)
Address Temple Bar, Ariz
Box 504

Name SANDRA Joni Dodson
(Please print)
Name Sandra J Dodson
(Signature)
Address P O Box 501
Temple Bar, Arizona

Name RICHARD William MANUNCINI
(Please print)
Name Rich [illegible]
(Signature)
Address P. O. Box 301
Temple Bar, Arizona

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David C. Manatee
Name David C. Manatee
(Please print)
Name
(Signature)
Address Temple Bar Resort
Temple Bar, Az

Name Curtis Duvall
(Please print)
Name
(Signature)
Address 291. Temple Bar
Temple Bar Az 86443

Name DONALD C GIESSEMAN
(Please print)
Name Donald C Giesseman
(Signature)
Address 15744 Richvale ave
Whittier CALIF, 90604

Name STEPHEN MCKENNA
(Please print)
Name Stephen McKenna
(Signature)
Address TEMPLE BAR RESORT
TEMPLE BAR, Az 86443

Name JO Y BARBER
(Please print)
Name Joy Barber
(Signature)
Address P.O. Box [illegible]
Temple Bar, AZ 86443

Name Virgil Chmielewski
(Please print)
Name Virgil Chmielewski
(Signature)
Address Temple Bar Ariz
86443

Name Darrell BARBER
(Please print)
Name Darrell Barber
(Signature)
Address PO BOX 564
Temple BAR AZ 86443

Name CAROLYN S. MANKIN.
(Please print)
Name Carolyn S. Mankin
(Signature)
Address P.O. BOX 515
TEMPLE BAR Az 86443

Name ALICE JOYCE SOARES
(Please print)
Name Alice Joyce Soares
(Signature)
Address 1956 BROADMOOR BL
SAN BERNARDINO, CA 92404

Name LARRY SOARES
(Please print)
Name Larry Soares
(Signature)
Address 1956 BROADMOOR
San Bernardino Ca 92404

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Name JOAN SCHARP
(Please print)
Name Joan Scharp
(Signature)
Address P.O. Box 372
Temple Bar, Az 86443

Name EDWARD TOMBA
(Please print)
Name Edward K. Tomba
(Signature)
Address P.O. BOX 543
Temple Bar Ariz 86443

Name HELEN J TOMBA
(Please print)
Name Helen J. Tomba
(Signature)
Address Box 543
Temple Bar Az 86443

Name TED J TREECE
(Please print)
Name Ted J Treece
(Signature)
Address 17419 125TH AVE
SUN CITY AZ

Name H. Lucile Treece
(Please print)
Name H. LUCILE TREECE
(Signature)
Address 17419 - 125th AVE.
SUN CITY WEST, AZ

Name Alvah C. Turner
(Please print)
Name Alvah C. T
(Signature)
Address P O Box 497
Temple Bar, Az 86443

Name ART MORALES
(Please print)
Name
(Signature)
Address 1717 E. BIRCH. #CC-103
BREA CA. 92621

Name J. WESLEY Allen
(Please print)
Name J. Wesley Allen
(Signature)
Address 644 CERBAT
KINGMAN, Az. 86401

Name JACK HILEM
(Please print)
Name Jack Hilem
(Signature)
Address TEMPLE BAR RESORT
P.O. BOX 286 TEMPLE BAR

Name IE DAVID
(Please print)
Name E David
(Signature)
Address 13131 SHAWNEE APT 268G
SEAL BEACH CA 90740

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Name Marjorie David
(Please print)
Name MARJORIE DAVID
(Signature)
Address 13131 Shawnee La 2686
Seal Beach, CA 90740

Name PAUL JORGENSEN
(Please print)
Name
(Signature)
Address 15512 WILLIAMS "C"
TUSTIN, CA. 92680

Name C.H. JORGENSEN, JR.
(Please print)
Name
(Signature)
Address RD1 Box 362
WALLINGFORD, VT 05773

Name LYLE KROG
(Please print)
Name Lyle Krog
(Signature)
Address T. B.
86443

Name LADONNA WILSON
(Please print)
Name LaDonna Wilson
(Signature)
Address P.O. Box 354
Temple Bar, Ariz

Name Frank Wilson
(Please print)
Name Frank Wilson
(Signature)
Address Box 354
Temple Bar Arz.

Name DORA I FLYNN
(Please print)
Name Dora I. Flynn
(Signature)
Address Box 253
Dolan Springs, 86441

Name Gary H. Giesler
(Please print)
Name Gary H. Giesler
(Signature)
Address 2275 Lorain Rd
San Marino 91108

Name MAUREEN GIESLER
(Please print)
Name Maureen Giesler
(Signature)
Address 2275 LORAIN
SAN MARINO CA 91108

Name Melanie Diamond
(Please print)
Name Melanie Diamond
(Signature)
Address Box 521
Temple Bar, AZ

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Name THOMAS BLAKE
(Please print)
Name Thomas Blake
(Signature)
Address TEMPLE BAR RST
TEMPLE BAR AZ. 86443

Name FLOYD SCHARP
(Please print)
Name Floyd Scharp
(Signature)
Address Temple Bar Resort
P.O.B 372 Temple Bar az. 86443

Name [illegible]
(Please print)
Name [illegible]
(Signature)
Address [illegible]
[illegible]

Name ARYLENE Smith
(Please print)
Name Arylene Smith
(Signature)
Address P.O. Box 353
Temple Bar, az 86443

Name Willis E Smith Jr
(Please print)
Name [illegible]
(Signature)
Address P.O. Box 353
TEMPLE BAR, AZ 86443

Name Paul Bevan
(Please print)
Name Paul Bevan
(Signature)
Address Temple Bar
Az 86443

Name ROBERT MANKIN
(Please print)
Name Robert Mankin
(Signature)
Address P.O. Box 515
TEMPLE BAR, Az 86443

Name RICHARD L. HOOVER
(Please print)
Name Richard L. Hoover
(Signature)
Address TEMPLE BAR RESORT
TEMPLE BAR AZ.

Name Susan Schwendimann
(Please print)
Name Susan M. Schwendimann
(Signature)
Address 14421 Poplar Dr.
Tustin, CA 92680

Name TERRI L Pollock
(Please print)
Name Terri L. Pollock
(Signature)
Address PO 331
Temple Bar, Ariz. 86443

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Name Don Stark
(Please print)
Name Don Stark
(Signature)
Address Box 521
Temple Bar. AZ 86443

Name John M Styers
(Please print)
Name John M Styers
(Signature)
Address 247 So Elder ST
Anaheim Ca 92805

Name Rosetta Styers
(Please print)
Name
(Signature)
Address 247 So. Elder St
Anaheim Ca 92805

Name Van L. JOHNSON
(Please print)
Name Van L. Johnson
(Signature)
Address 6302 Lewis Av.
Long Beach Calif. 90815

Name NANCY JOHNSON
(Please print)
Name Nancy Johnson
(Signature)
Address 6302 Lewis Ave
LONG BEACH, CA 90815

Name AL FHUERE
(Please print)
Name Al Fhuere
(Signature)
Address 3955 N. Bonita GVSR.
Kingman AZ 86401

Name KEVIN FHUERE
(Please print)
Name Kevin Fhuere
(Signature)
Address 3955 N. Bonita GVSR
KINGMAN AZ 86401

Name Martin Lane
(Please print)
Name Martin B Lane
(Signature)
Address 12101 Dale
Stanton Calif

Name DANIEL DART
(Please print)
Name
(Signature)
Address 8414 Larkdale Rd
San Gabriel CA 91775

Name Pam Dart
(Please print)
Name Pamela Dart
(Signature)
Address 8414 Larkdale Rd,
San Gabriel, Ca 91775

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✓ Name [illegible] (FRANCISCO C. GARCIA)
(Please print)
Name
(Signature)
Address 8961 HERBERT APT 1
EL PASO, TX 79904

✓ Name DON. KLARK
(Please print)
Name Don Klark
(Signature)
Address 3750 ARVILLE #376.
LAS VEGAS, NEV. 89103

✓ Name T. KLARK
(Please print)
Name T. Klark
(Signature)
Address 3750 ARVille #376
Las Vegas, Nev. 89103

✓ Name Mike Frasier
(Please print)
Name MIKE FRASIER
(Signature)
Address 1123 [illegible]
Boulder City [illegible]

Name Melvin Sutton
(Please print)
Name Melvin C. Sutton
(Signature)
Address P.O. Box 28818
89126

✓ Name Larry E MASON
(Please print)
Name Larry E Mason
(Signature)
Address 7111 Springwood ST.
LAS VEGAS, NV 89117

✓ Name ROBERT NEWBY
(Please print)
Name Robert Newby
(Signature)
Address 414 [illegible]
Boulder City, Nevada 89005

✓ Name ROBERT H REYNOLDS
(Please print)
Name Robert H Reynolds
(Signature)
Address 1468 [illegible]
Boulder City, NV

✓ Name SHIRLEY B MOSES
(Please print)
Name Shirley B. Moses
(Signature)
Address 3180 Pinehurst Dr.
L.V. Nv 89109

✓ Name Emily R Segale
(Please print)
Name EMILY R. SEGALE
(Signature)
Address 657 DEL PRADO
BOULDER CITY, NV 89005

Please mail completed petitions to: Playmate Resort Marinas
322 Lakeshore Road
Boulder City, Nevada 89005

TO BE PRESENTED TO CONGRESSMAN HARRY REID IN OCTOBER 1983

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✓ Name KEN DAVIS
(Please print)
Name Ken Davis
(Signature)
Address 700 MARINA DR.
Boulder City NV. 89005

✓ Name LEO VILLANI
(Please print)
Name Leo Villani
(Signature)
Address 700 MARINA DR.
BOULER CITY NV. 89005

✓ Name MARGARET BACON
(Please print)
Name Margaret Bacon
(Signature)
Address 4572 Brookside Way
LAS VEGAS, NE-89121

✓ Name WAYNE R. BACON
(Please print)
Name Wayne R. Bacon
(Signature)
Address 4572 Brookside Way
LAS VEGAS, NE-89121

✓ Name ROSEMARY Johnson
(Please print)
Name Rosemary Johnson
(Signature)
Address 19 Nevada Way
Henderson, Nv.

✓ Name M.R. Woods
(Please print)
Name M. Russell Woods
(Signature)
Address 383 Cove Ct
Henderson, NEV 89015

✓ Name JUDY A. WOODS
(Please print)
Name Judy A. Woods
(Signature)
Address 383 COVE CT
HENDERSON, NV 89015

✓ Name Steve Johnson
(Please print)
Name Steve Johnson
(Signature)
Address 19 Nevada Way
Henderson, Nevada

✓ Name HEIDI RASER
(Please print)
Name Heidi Raser
(Signature)
Address 500 S. 13TH
L.V. NV. 89101

✓ Name JOHN RASER
(Please print)
Name John Raser
(Signature)
Address 500 So. 13th
L.V.

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✓ Name (Please print) MARV VANDERPOOL
Name (Signature) Marv Vanderpool
Address 840 MARINA DR
Boulder City NEV 89005

✓ Name (Please print) Henry Bender
Name (Signature) Henry Bender
Address 1293 Black Mtn Ct
Boulder City Nev 89005

✓ Name (Please print) LINDA MILTON
Name (Signature) Linda Milton
Address 1624 S Palm #337
LAS VEGAS, NV. 89104

✓ Name (Please print) CLARK MILTON
Name (Signature) Clark Milton
Address 1624 S. Palm #337
Las Vegas, Nev 89104

Name (Please print) MAlcolm Dow.
Name (Signature) Malcolm Dow
Address 3035-B. PINEHURST.
L.V. 89109.

✓ Name (Please print) FRANK Suffoletta
Name (Signature) Frank Suffoletta
Address 1931 Rawhide St
Las Vegas, Nevada 89119

✓ Name (Please print) Bill PHillips
Name (Signature) Wm Phillips
Address 308 YUMA Ct.
BOULDER CITY

✓ Name (Please print) Don Gohn.
Name (Signature) Don Gohn
Address 650 MT BONA WAY
BOULDER CITY NV. 89005

✓ Name (Please print) Roger Diehl
Name (Signature) Rog Diehl
Address 536 Lake Terrace Dr.
B.C.N. 89005

✓ Name (Please print) John Thompson
Name (Signature) John Thompson
Address 2658 Heritage Ct
LAS Vegas, Nev 89121

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✓ Name (Please print) FRED STRAFFORD
Name (Signature) Fred Strafford
Address 1297 Kelpwood
B.C NV 89005

✓ Name (Please print) Kevin Keegan
Name (Signature) Kevin J Keeg
Address 367 Del Rey
BL NV 89005

✓ Name (Please print) BARBARA REESE
Name (Signature) Barbara Reese
Address 773 Sandra Dr
B.C. Nev. 89005

✓ Name (Please print) Rita Oxborrow
Name (Signature) Rita Oxborrow
Address 132 LINDEN St
HEND. NEV. 89015

✓ Name (Please print) DANIEL HAYES
Name (Signature) Daniel Hayes
Address 82 COLbath Ave
LAS VEGAS, NEVADA 89110

✓ Name (Please print) Larry D. Boyd
Name (Signature) Larry D. Boyd
Address 118 King st.
Pittman, NV. 89044

✓ Name (Please print) SUSAN J ROGAS
Name (Signature) Susan J. Rogas
Address 937 Major
Henderson Nev. 89015

✓ Name (Please print) STEVE BURRUS
Name (Signature) Steve Burrus
Address 5871 Brea bluff Ave
LAS VEGAS NEV 89122

✓ Name (Please print) Jo ANN BURRUS Delete
Name (Signature) J. Ann Burrus
Address 5871 BRIENHILT
L.V. NV, 89122

✓ Name (Please print) JEFFREY A. COOKE
Name (Signature) Jeffrey A. Cooke
Address 627 DON VINCENTE DR
BOULDER CITY, NV 89005

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✓ Name DARRYL LANE
(Please print)
Name Daryl Lane
(Signature)
Address Box 723
Boulder City NV 89005

✓ Name FELIX RAVENDO
(Please print)
Name Felix Ravendo
(Signature)
Address #108 3550 PARADISE
LAS VEGAS - 89109

✓ Name AMADO DELGADO, JR.
(Please print)
Name Amado Delgado Jr.
(Signature)
Address 813-BEDFORD RD.
LAS VEGAS, NV 89107

✓ Name [illegible] McMURRAY
(Please print)
Name B. W. McMurray
(Signature)
Address 3662 Barcelona
Las Vegas, Nev. 89121

✓ Name Beverly McMURRAY
(Please print)
Name Beverly McMurray
(Signature)
Address 3662 Barcelona
Las Vegas, Nev. 89121

Name DIANNA L. CONKLIN
(Please print)
Name Dianna L. Conklin
(Signature)
Address 701 E. MILLETT
MESA, AZ. 85204

Name [illegible] SHERMAN
(Please print)
Name [illegible]
(Signature)
Address [illegible] MILLETT MESA
ARIZONA [illegible]

✓ Name GAIL DRAKE
(Please print)
Name Gail Drake
(Signature)
Address [illegible]
Las Vegas, NV [illegible]

✓ Name [illegible]
(Please print)
Name [illegible]
(Signature)
Address [illegible]
[illegible]

Name Ted Sky / TED SOROSKY
(Please print)
Name ~~[illegible]~~
(Signature)
Address 17702 IRVINE BLVD
TUSTIN, CA. 92680

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✓Name James R. Lusch
(Please print)
Name James R. Lusch
(Signature)
Address 1405 Gloria Ln.
Boulder City, NV. 89005

✓Name Robert Ritz
(Please print)
Name Robert Ritz
(Signature)
Address 3950 Las Vegas Blvd. So. #[illegible]
L.V. Nev 89119

✓Name Cyndi Dyer
(Please print)
Name Cyndi Dyer
(Signature)
Address 501 Wyoming
Boulder, NV 89005

✓Name A.D. TAGGART
(Please print)
Name A.D. Taggart
(Signature)
Address 3532 VALENCIA ST
LAS VEGAS, NEV 89121

✓Name HARRY DUTY
(Please print)
Name Harry P. Duty
(Signature)
Address 485 Rose Way
HENDERSON, NV 89015

✓Name Mark Eagleson
(Please print)
Name Mark Eagleson
(Signature)
Address 501 Wyoming
Boulder, NV 89005

✓Name Donald D. Bradley
(Please print)
Name Donald D. Bradley
(Signature)
Address 21816 Rashdall
Carson Ca 90745

✓Name WAYNE T. FORD
(Please print)
Name Wayne T. Ford
(Signature)
Address 4465 ROCHELLE AV.
L.V. 89102

✓Name SHIRLEY LANE
(Please print)
Name Shirley Lane
(Signature)
Address BOX 723
BOULDER CITY, NV 89005

Name DARWIN Pilger
(Please print)
Name
(Signature)
Address 3675 Happy Ln
Las Vegas Nev 89120

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Boulder City, Nevada 89005

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✓ Name Wayne Johanson
(Please print)
Name Wayne J. Johanson
(Signature)
Address 1302 Georgia D
Boulder City Nev 89005

✓ Name JOE CARRAHER
(Please print)
Name
(Signature)
Address 667 AVE A
BOULDER CITY, NV 89005

✓ Name Al Williser
(Please print)
Name
(Signature)
Address 967 E. SAHARA
LV 89104

✓ Name EARNEST HELDREN
(Please print)
Name Earnest Heldren
(Signature)
Address 127 E BARCLAY
LONG BEACH CALIF 90805

✓ Name [illegible] Ives
(Please print)
Name
(Signature)
Address 2112 Dune Dr
Las Vegas Nv 89106

✓ Name Sharon Morgan
(Please print)
Name Sharon Morgan
(Signature)
Address 1516 Dorothy Dr
Boulder City Nev 89005

✓ Name SHELDON R GOTTSCHALK
(Please print)
Name Sheldon R. Gottschalk
(Signature)
Address 874 DEL REY
BOULDER CITY NEV 89005

✓ Name R.H. McClintock
(Please print)
Name
(Signature)
Address 4444 Boulder
L.V. 89121

✓ Name W. R. Woods Dup
(Please print)
Name W. R. [illegible]
(Signature)
Address 3535 [illegible] Ct
[illegible]

✓ Name Christine Christensen
(Please print)
Name Christine Christensen
(Signature)
Address 5315 [illegible] Dr
LV, NV 89103

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✓ Name ELEANOR KELTZ
(Please print)
Name Eleanor C Keltz
(Signature)
Address 1166 Palomino St
Henderson, Nev 89015

Name Tracy Godfrey
(Please print)
Name Eric Anderson
(Signature)
Address 1571 Del Prado

✓ Name WILLIAM BEIL
(Please print)
Name
(Signature)
Address 4444 DENNIS WY
LV NV 89121

✓ Name [illegible] BERNARD
(Please print)
Name [illegible] Bernard
(Signature)
Address 374 [illegible]
LAS VEGAS NEV 89119

✓ Name [illegible]
(Please print)
Name [illegible]
(Signature)
Address 4801 Sahara Ave
Las Vegas Nev

✓ Name TONY ALBANO
(Please print)
Name Tony Albano
(Signature)
Address
[illegible] Dr
NV 89121

✓ Name [illegible] H [illegible]
(Please print)
Name [illegible]
(Signature)
Address 713 E. Sahara #576
Las Vegas NV 89104

✓ Name CHARLOTTE KELLY
(Please print)
Name Charlotte Kelly
(Signature)
Address 5701 Sawyer Ave
L.V. 89108

✓ Name Anthony [illegible] Somers
(Please print)
Name [illegible]
(Signature)
Address 2191 E [illegible]
Las Vegas NV 89109

Name [illegible]
(Please print)
Name
(Signature)
Address 113 [illegible] St
LAS VEGAS NEV

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Name (Please print) PETE CAHILL
Name (Signature) Pete Cahill
Site 2
Address ECHO BAY RESORT
OVERTON, NEVADA 89040

✓ Name (Please print) James LaPorte
Name (Signature) James LaPorte
Address Echo Bay Resort
Overton Nevada 89040

✓ Name (Please print) Richard K Tilley
Name (Signature)
Address EchoBay Resort
Overton Nev 89040

Name (Please print) CHARLES BURNS
Name (Signature) Charlie Burns
Address Echo BAY RESORT
Overton NEVADA

✓ Name (Please print) Stephanie Burns
Name (Signature) Stephanie Burns
Address Echo Bay Resort
Overton, Nev 89040

✓ Name (Please print) JAMES M. DUNN
Name (Signature)
Address ECHO BAY RESORT
OVERTON, NEVADA 89040

✓ Name (Please print) J. L. SMITH, JR.
Name (Signature) James L. Smith, Jr.
Address Echo Bay Resort
OVERTON, NEV. 89040

✓ Name (Please print) PAUL J. ROWLAND
Name (Signature) Paul J. Rowland
Address Echo Bay Resort.
Overton Nv. 89040

Name (Please print) David Jones
Name (Signature) David Jones
Address 20602 Alicante Lane
Huntington Beach, Ca

Name (Please print) BRENDA B. FLORIO
Name (Signature) Brenda B. Florio
Address 1033" Broadmoor
La Puente Ca. 91744

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Boulder City, Nevada 89005

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Name JOE BURNS
(Please print)
Name Joe Burns
(Signature)
Address ECHO BAY RESORT
OVERTON NV. 89040

Name DOUGLAS BARTLETT
(Please print)
Name Douglas Bartlett
(Signature)
Address Echo Bay Resort
Overton, NV. 89040

Name MARIE ADAMS
(Please print)
Name Marie Adams
(Signature)
Address 8712 Magnolia Sp 252
Santee, Calif 92071

√ Name Marlene Price
(Please print)
Name Marlene Price
(Signature)
Address Echo Bay Resort
Overton NV 89040

Name [illegible]
(Please print)
Name [illegible]
(Signature)
Address PO Box 334
[illegible]

√ Name GEORGE DAVIS
(Please print)
Name George Davis
(Signature)
Address ECHO BAY RESORT
OVERTON NEV 89040

Name Ronald R M. Ne
(Please print)
Name [illegible]
(Signature)
Address

√ Name DONALD L SZESTEY
(Please print)
Name [illegible]
(Signature)
Address Echo BAY

√ Name LARRY Ordway
(Please print)
Name Larry Ordway
(Signature)
Address Echo Bay

Name TINA LAPORTE
(Please print)
Name Tina LaPorte
(Signature)
Address Echo BAY RESORT
Overton NV 89040

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✓ Name James LaPorte
(Please print)
Name James LaPorte
(Signature)
Address Echo Bay Resort
Overton, NV 89040

✓ Name Mindy Cooper
(Please print)
Name Mindy Cooper
(Signature)
Address Logandale, Nev
89021

✓ Name Pat Arrasate
(Please print)
Name Pat Arrasate
(Signature)
Address Echo Bay Resort Marina
Trailer Village Overton, NV.

✓ Name Van L. Allen
(Please print)
Name Van L. Allen
(Signature)
Address Echo Bay Resort

✓ Name EARL Trueblood
(Please print)
Name Earl Trueblood
(Signature)
Address Echo Bay

Name Barbara Diaz
(Please print)
Name Barbara Diaz
(Signature)
Address Box 38
Logandale Nev. 89021

✓ Name Bessie E. GRIZZLE
(Please print)
Name Bessie I. Grizzle
(Signature)
Address ECHO BAY Resort
Overton Nev. 89040

✓ Name Oscar T Brooks
(Please print)
Name Oscar T. Brooks
(Signature)
Address Echo Bay Resort

Name Melanie Jones
(Please print)
Name Melanie Jones
(Signature)
Address Logandale, NV
89021

Name Gerald Smith
(Please print)
Name
(Signature)
Address

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✓ Name Susan Jaramillo
(Please print)
Name Susan Jaramillo
(Signature)
Address Echo Bay Resort
Overton, Nev.

✓ Name Debbie Perkins
(Please print)
Name Deborah Perkins
(Signature)
Address P.O. Box 655
Overton, NV. 89040

✓ Name JESSE FLETCHER
(Please print)
Name Jesse E. Fletcher
(Signature)
Address Echo Bay Resort
Overton, NV 89040

✓ Name BEVERLY BURKE
(Please print)
Name Beverly Burke
(Signature)
Address 308 Yuma Court
Boulder City NV 89005

✓ Name Bob Clark
(Please print)
Name
(Signature)
Address 1533 IRENE DR.
BOULDER CITY, NV 89005

✓ Name LOUIS E. MARTORANO
(Please print)
Name L. E. Martorano
(Signature)
Address 768 Lakeshore Rd Box 99
Boulder City, NV

Name CHERYL D SCHAUMBURG
(Please print)
Name Cheryl D. Schaumburg
(Signature)
Address 832 ROBINSON LN
BOULDER CITY, NEVADA

Name
(Please print)
Name
(Signature)
Address

Name
(Please print)
Name
(Signature)
Address

Name
(Please print)
Name
(Signature)
Address

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✓ Name RAYmond Vigil
(Please print)
Name Raymond Vigil
(Signature)
Address 6440 CASADA WAY #C
LAS Vegas Nevada

✓ Name MIKE VIGIL
(Please print)
Name Mike A. Vigil
(Signature)
Address 6259 GUNDERSON
LAS VEGAS, NEVADA, 89103

✓ Name ED ZAREMBA
(Please print)
Name SHIRLey ZaREmba
(Signature)
Address 2810 S LAMB #32
LAS VEGAS NEV. 89121

✓ Name Rick BEARD
(Please print)
Name Joe Zek
(Signature)
Address 6445 PEARTREE
las vegas Nev 89108

✓ Name PENNY + Jim Fitzgerald
(Please print)
Name Penny Fitzgerald
(Signature)
Address 2974 Berman St
L.V. Nev 89109

Name Nancy Wells
(Please print)
Name Nancy Wells
(Signature)
Address 11229 Teakwood Cr.
Sandy, UT 84092

Name Doug Wells
(Please print)
Name Douglas L. Wells
(Signature)
Address 11229 ~~Teakwood~~ Cir
SANDY, UT 84092

Name Micki Welch
(Please print)
Name Micki Welch
(Signature)
Address 1744 E. Oak Circle
Sandy Utah 84092

✓ Name FRANK P. ALTMAN
(Please print)
Name Frank P. Altman
(Signature)
Address 7093 W. Sprucewood St
L.V. Nev-89117

✓ Name PHILIP T. ALTMAN
(Please print)
Name Philip T. Altman
(Signature)
Address 7093 Sprucewood
L.V. NV. 89117

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✓ Name JOSEPH SOCKOL
(Please print)
Name Joseph Sockol
(Signature)
Address Echo BAY RESORT
OVERTON, NV

✓ Name Clementine Pristo
(Please print)
Name Clementine Prieto
(Signature)
Address Box 246, Overton
NV. 89040

Name JACKIE LINDEN
(Please print)
Name Jackie Linden
(Signature)
Address 9032 Duarte Rd
San Gabriel, Ca.

Name Debbie Polchow
(Please print)
Name Debbie Polchow
(Signature)
Address 1649 Amberwood
So Pasa. Ca 91030

Name CHERYL McCREARY
(Please print)
Name Cheryl McCreary
(Signature)
Address 1615 AVON PLACE
SO. PASADENA, CA 91030

✓ Name Roberta SHARON
(Please print)
Name Roberta Sharon
(Signature)
Address 6501 W. Charleston #95
Las Vegas, Nev 89102

✓ Name Mel Sharon
(Please print)
Name MELVIN SHARON
(Signature)
Address 6501 W CHARLESTON #95
LAS VEGAS, NEV 89102

✓ Name Norva Salley
(Please print)
Name NORVA SALLEY
(Signature)
Address P.O Box 801
Overton, Nev 89040

Name Henry G. Davenport
(Please print)
Name HENRY G. DAVENPORT
(Signature)
Address 518 E. Camile St.
SANTA ANA CA 92701

✓ Name Luther H. Sears
(Please print)
Name LUTHER H. SEARS
(Signature)
Address P.O BOX 751
OVERTON, NEV 89040

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✓ Name TED TEDESCO
(Please print)
Name Ted Tedesco
(Signature)
Address 3485 MOBERLY AVE
L.V. NV 89118

✓ Name DONALD R. MACKAY
(Please print)
Name Donald R Mackay
(Signature)
Address 1728 ADRA Ct
LAS VEGAS NV 89102

✓ Name DEIDRA HEISLER
(Please print)
Name Deidra Heisler
(Signature)
Address Echo Bay Resort
Overton NV 89040

✓ Name MARILYN CHAUSMER
(Please print)
Name Marilyn Chausmer
(Signature)
Address 3937 S. Spencer - Apt 209
Las Vegas Nev. 89109

✓ Name HAROLD CHAUSMER
(Please print)
Name Harold Chausmer
(Signature)
Address 3937 Spencer St apt. 209
Las Vegas Nevada 89109

✓ Name JOHN SALLEY
(Please print)
Name WILMA SALLEY
(Signature)
Address P.O. BOX 861
OVERTON NV. 89040

✓ Name MILDRED WEATHERS
(Please print)
Name Mildred E Weathers
(Signature)
Address Echo Bay Resort
Overton Nev 89040

Name Joe A. Lipe
(Please print)
Name Joe A Lipe
(Signature)
Address 552 [illegible] St.
Morro Bay, Calif. 93442

Name JOHN G. ELMER
(Please print)
Name J Elmer
(Signature)
Address 8925 [illegible] Dr.
[illegible] Pa.

✓ Name David J. Shea
(Please print)
Name D J Shea
(Signature)
Address 4381 Toledo Ave
LV, NV 89121

Please mail completed petitions to: Playmate Resort Marinas
322 Lakeshore Road
Boulder City, Nevada 89005

TO BE PRESENTED TO CONGRESSMAN HARRY REID IN OCTOBER 1983

PETITION

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Name (Please print) Cindy Robertson
Name (Signature) Cindy Robertson
Address 1279 W Norberry
Lancaster, Ca. 93534

Name (Please print) Kathy Fielden
Name (Signature) Kathy Fielden
Address 44136 Division St Apt C
Lancaster, Ca 93534

Name (Please print) PETE CAHILL
Name (Signature) Peter Cahill
Address ECHO BAY RESORT
OVERTON, NEVADA, 89040

Name (Please print) DAVID BRADLEY
Name (Signature) Bradley
Address Echo Bay Resort
Logandale Nevada 89024

Name (Please print) CHRIS JENSEN
Name (Signature) Chris Jensen
Address 21661 AVENIDA ALBERCON
EL TORO CALIFORNIA 92630

√ Name (Please print) Beverly Culbertson
Name (Signature) Beverly Culbertson
Address Echo Bay Resort
Overton, Nv 89040

Name (Please print) M. Vought
Name (Signature) M Vought
Address 3235 GRANDE VISTA
SAN BERNARDINO, CA - 92405

Name (Please print) PAT VOUGHT
Name (Signature) Pat Vought
Address 3235 GRANDE VISTA
SAN BERNARDINO - CA - 92405

Name (Please print) JUAN GARCIA
Name (Signature) Juan Garcia
Address P.O. Box 394
Logandale, Nevada

Name (Please print) R. N HODKINS
Name (Signature)
Address Echo Bay Resort

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Name Bonnie J. Frogner
(Please print)
Name Bonnie J Frogner
(Signature)
Address 3771 Industrial Rd
Las Vegas, NV.

Name J C Brown
(Please print)
Name J C Brown
(Signature)
Address Echo Bay Resort
OVERTON NEV.

Name CHARLES L. ADAMS
(Please print)
Name Charles L Adams
(Signature)
Address 8712 Magnolia Sp 252
Santee, Ca.

Name CARROLL R WEATHERS
(Please print)
Name Carroll R Weathers
(Signature)
Address Echo Bay Resort
Overton, Nevada 89040

Name Barbara Vandal
(Please print)
Name BARBARA VANDAL
(Signature)
Address 12272 Coronado
Santa Ana CA 92705

Name John L V Biggs
(Please print)
Name JOHN L BIGGS
(Signature)
Address 1555 9 24th St
Upland, CA 91786

Name WILMA L SALLEY
(Please print)
Name Wilma L Salley
(Signature)
Address PO. Box 201
Overton NV 89040

Name HAROLD Kaufman
(Please print)
Name Harold Kaufman
(Signature)
Address 5120 Darcon Way
LV NV 89107

Name William D. Solesbee
(Please print)
Name William D. Solesbee
(Signature)
Address 107 S. MAIN ST
PLACENTIA CA 92670

Name Michael J Yorba
(Please print)
Name MICHAEL J. YORBA
(Signature)
Address 20016 Winton St
CORONA Ca. 91720

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Name E. R. OLSON
(Please print)
Name E R Olson
(Signature)
Address 6015 E. CONSTANTINE RD
ANAHEIM CA 92807

Name CATHY DEAN
(Please print)
Name Cathy Dean
(Signature)
Address 926 S ROBERT #2
ANAHIEM CALIF. 92802

Name Tim Korick
(Please print)
Name Tim Korick
(Signature)
Address 430 Shady CT
Brea, Ca

Name Cathy Bothwell
(Please print)
Name Glenn M. Bothwell
(Signature)
Address 7822 Ledon
Midway City, Ca. 92655

Name Jeffrey A. Pecklem
(Please print)
Name JS
(Signature)
Address 15 Locust st Irvine
Calif

Name
(Please print)
Name C. DURAN
(Signature)
Address 1312 Michelle
Ce. Covina CA Cal.

Name ROXANNE FRANKS
(Please print)
Name R Frank
(Signature)
Address 3437 Pine Brook
Costa Mesa Ca

Name BOB PRATT
(Please print)
Name Bob Pratt
(Signature)
Address 531 Wilier
CHULA VISTA CA.

Name James Richards
(Please print)
Name James Richards
(Signature)
Address 6320 Belle Ave
Buena Park CA

✓ Name Carl S. Tierno Sr.
(Please print)
Name Carl [illegible] Jr.
(Signature)
Address Echo Bay Resorts
Overton, NV. 89040

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Name MELODY BIENERT
(Please print)
Name Melody Bienert
(Signature)
Address 208 Huntington St
Huntington Beach Ca
92648

Name Sherry Wood
(Please print)
Name Sherry Wood
(Signature)
Address 12951 East End Ave
Chino, CA 91710

Name MARY JO MORRISON
(Please print)
Name Mary Jo Morrison
(Signature)
Address P.O. Box 548
Overton, Nevada 89040

Name RICHARD J. LEACH
(Please print)
Name Richard J Leach
(Signature)
Address 8706 MARIPOSA ST.
LA MESA CALIF. 92041

Name DIANA McDOUGAL
(Please print)
Name Diane McDougal
(Signature)
Address 2720 Del Rosa
Phelan Ca 92371

Name Violet Plummer
(Please print)
Name
(Signature)
Address 3390 Darrow Rd.
Stow, Ohio 44224

Name Lori Dodson
(Please print)
Name Lori Dodson
(Signature)
Address 3640 Wood Bridge Dr.
Nashville, Tn. 37217

Name Bee Egli
(Please print)
Name Beatrice Egli
(Signature)
Address Schickstr. 1
8400 Winthur, Switzerland

Name Debbie Dufour
(Please print)
Name Debbie Dufour
(Signature)
Address 14020 Tiger Bend Rd. #1
Baton Rouge, LA

Name Malcolm Dufour
(Please print)
Name Malcolm Dufour
(Signature)
Address 9876 Grand Teton
Baton Rouge, LA

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Name Russell J. Wood
(Please print)
Name Russell J. Wood
(Signature)
Address 12951 East End
Chino Ca 91710

Name LISA J. WATTERS
(Please print)
Name Lisa J. Watters
(Signature)
Address 4108 Old Topanga Cyn Rd
Calabasas, Ca 91302

Name BOB SPEICHER
(Please print)
Name Bob Speicher
(Signature)
Address 13447 E Palm W1
Cerritos CA 90701

Name GARY SHIOTA
(Please print)
Name Gary Shiota
(Signature)
Address 17501 SONORA
CERRITOS Ca 90701

Name Eugene ARRASATE JR.
(Please print)
Name Eugene Arrasate Jr.
(Signature)
Address Echo Bay Resort
Trailer Park, N.V.

Name Don Turner
(Please print)
Name Don Turner
(Signature)
Address 1219 Jerome Way
Napa, Ca. 94558

✓ Name Arlene TAFLINGER
(Please print)
Name Arlene K. Taflinger
(Signature)
Address 5900 W. TROPICANA #46.
Las Vegas Nv 89103

Name ~~Mike Heister~~ Mike Heister
(Please print)
Name Mike Heister
(Signature)
Address Echo BAY

✓ Name Juanita JUANITA B MOORE
(Please print)
Name Juanita B Moore
(Signature)
Address 4670 Fiesta Way
Las Vegas Nev 89121

✓ Name Barbara A McDonald
(Please print)
Name Barbara A. McDonald
(Signature)
Address 4670 Fiesta Way
Las Vegas, Nev 89121

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✓ Name Viola Richards
(Please print)
Name Viola Richards
(Signature)
Address Echo Bay Resort
Overton Nev.

Name E. VREDENBURG
(Please print)
Name
(Signature)
Address 2822E 3365S
SLC- UTAH

Name Fred E Hodgson
(Please print)
Name Fred E Hodgson
(Signature)
Address 1533 Jamestown Dr
SLC UT 84121

Name Colleen Holley
(Please print)
Name Colleen Holley
(Signature)
Address Box 18201
SLT Ca 95706

Name Felene Astorga
(Please print)
Name Felene Astorga
(Signature)
Address 1228 Stutz NE
Albuq n.m. 87112

Name JOE J DARUTY
(Please print)
Name Joe J Daruty
(Signature)
Address 6457 Valley Cir Ln
Canoga Park Ca 91307

Name A.E. TEACHOUT
(Please print)
Name A E Teachout
(Signature)
Address 67 TOMINO WAY
HOT SPRINGS VILLAGE, AR 71909

Name ALFRED R. DION
(Please print)
Name
(Signature)
Address 2901 CENTER ST S.A.C

✓ Name DAYLE DAVIES
(Please print)
Name Dayle Davies
(Signature)
Address 245 So. Wallace
LV NEV 89107

✓ Name Rick ANDREWS
(Please print)
Name
(Signature)
Address 3871 S. Valley View #5
LV NV 89103

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✓ Name Mike + Judy Kemp
(Please print)
Name Judy Kemp
(Signature)
Address 1654 Stephan Burnel Ct
LV 89102

Name Michael [illegible]
(Please print)
Name
(Signature)
Address

✓ Name RICHARD BREEDLOVE
(Please print)
Name Richard Breedlove
(Signature)
Address 3514 Bransford Cr.
L.V. Nv. 89104

Name MARY H. DAVIES
(Please print)
✓ Name Mary H. Davies
(Signature)
Address 245 S. Wallace Dr.
Las Vegas, Nev. 89107

✓ Name KATHY WHITE
(Please print)
Name Kathy White
(Signature)
Address 1224 N. Smith
Las Vegas NV 89108

✓ Name ED LIAN
(Please print)
Name NANCY LIAN
(Signature)
Address 5285 RAMBLING RD
LAS VEGAS NEV 89120

✓ Name Pete BODNAR
(Please print)
Name Pete Bodnar
(Signature)
Address 309 Bedford
LAS VEGAS 89107

✓ Name WILLIAM RIZZO
(Please print)
Name Billy Rizzo
(Signature)
Address 4523 Via San Marco
L.V. 89103

Name LARRY TURNER
(Please print)
Name Larry Turner
(Signature)
Address 897 EL CAMINO
Boulder City, NV

✓ Name C J ROSE
(Please print)
Name Clinton J Rose Jr.
(Signature)
Address 1113 CAHILL
LAS VEGAS, NEV 89128

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Name RON & CAROL GILMORE
(Please print)
Name Ronald L. Gilmore
(Signature)
Address 2015 temple trail
Jamul Ca. 92035

✓ Name SUSIE SZELESTEY
(Please print)
Name Susie Sylestey
(Signature)
Address Gen. Del. NO
Overton NEV. 89040

✓ Name Erika Banschback
(Please print)
Name Erika Banschback
(Signature)
Address 1057 Singapore
LAS VEGAS NEV. 89108

Name ZENA J. LEE
(Please print)
Name Zena J. Lee
(Signature)
Address 2887 Ruff Ave.
Pinole, Ca. 94564

Name CHARLES E LEE
(Please print)
Name Charles E Lee
(Signature)
Address 2887 RUFF AVE
PINOLE, CA. 94564

Name KARYN G. LEE-THOMAS
(Please print)
Name Karyn G. Lee-Thomas
(Signature)
Address 1250 TROUT GULCH RD
APTOS CA 95003

Name DAVID L. THOMAS
(Please print)
Name David L Thomas
(Signature)
Address 1250 TROUT Gulch RD
APTOS CA, 95003

Name Kelleen Ferguson
(Please print)
Name Kelleen Ferguson
(Signature)
Address Stevens Ave.
Logandale Nev.

✓ Name G. M. Beglau
(Please print)
Name Geraldine M. Beglau
(Signature)
Address 3339 Lost Hills Dr
Las Vegas, NV. 89122

✓ Name HENRY G. BEGLAU
(Please print)
Name Henry G. Beglau
(Signature)
Address 3339 LOST HILLS DR.
LAS VEGAS NEV. 89122

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✓ Name (Please print) WILLIAM PAUL KELLY
Name (Signature) William Paul Kelly ✓
Address 5239 BRENTMEAD DRIVE
LAS VEGAS NEV. 891020

✓ Name (Please print) BOBBY P. MARTIN
Name (Signature) Bobby Pmartin
Address ECHO BAY RESORT
OVERTON, NV. 89040

✓ Name (Please print) DON RIEBE
Name (Signature) Don Riebe
Address Echo Bay Resort
Overton, NV. 89040

✓ Name (Please print) RITA FREELS
Name (Signature) Rita Freels
Address Echo Bay Resort
OVERTON NV 89040

✓ Name (Please print) Terri Calder
Name (Signature) Terri Calder
Address Echo Bay Resort
Overton, Nevada 89040

Name (Please print) Robert W. Clark
Name (Signature) John W Clark
Address Echo Bay Resort
Overton Nev 89040

✓ Name (Please print) ROBERT B. CALDER JR.
Name (Signature) Robert B. Calder Jr.
Address ECHO BAY RESORT
OVERTON NEV. 89040

Name (Please print) NORMAN M. Florio
Name (Signature) Norman M. Florio
Address 1033 N. BROADMOOR AVE.
LA PUENTE, CAL

Name (Please print) ROBERT SUTTER
Name (Signature)
Address 3936 VOXNA
LAS VEGAS NV 89109

Name (Please print) John Ulotto
Name (Signature)
Address 2812 [illegible]
Las Vegas

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Name PETERM. SilviA
(Please print)
Name
(Signature)
Address 5720 Glen Eagles
Las Vegas NV. 89108

Name Susan Swan
(Please print)
Name Susan J Swan
(Signature)
Address 2244 Meadow
Cedar City, UT 84720

Name Ron MARTIN
(Please print)
Name Ron Martin
(Signature)
Address Echo Bay Resort
Overton, Nev 89040

Name E. WOODARD-JONES
(Please print)
Name
(Signature)
Address 5408 DEL MONTE AVE
LAS VEGAS, NV 89102

Name MARSHALL MASEK
(Please print)
Name Marshall J Masek
(Signature)
Address 3908 WEST VEGAS
DRIVE

Name RICHARD MASEK
(Please print)
Name Richard Masek
(Signature)
Address 3908 WEST VEGAS
Dr.

Name Roxanne Gysewski
(Please print)
Name
(Signature)
Address 635 Ave. A
Redondo Beach, Ca.

Name FRANK A. SODERQUIST
(Please print)
Name F.A. Soderquist
(Signature)
Address 111 No WHITMORE
OVERTON, NEVADA 89040

Name [illegible]
(Please print)
Name
(Signature)
Address PO Box 324
Overton Nev [illegible]

Name Bruce JENSEN
(Please print)
Name Bruce Jensen
(Signature)
Address Mesquite Nev

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✓ Name (Please print) H.W. (Ass) Greenwood
Name (Signature) H.W. YOUMANS
Address 935 Strawberry Pl
Henderson Nev 89015 ([illegible])

✓ Name (Please print) Monty I Brubaker
Name (Signature) Monty I Brubaker
Address 1334 Mustang Rd
B.C. Nevada 89005

✓ Name (Please print) MICHAEL J MERRILL
Name (Signature) Michael J Merrill
Address 5000 W. TROPICANA AVE
#305 LAS VEGAS NV 89103

✓ Name (Please print) JAMES R. COORN
Name (Signature) James R. Coorn
Address 588 Burton st
Henderson Nev

✓ Name (Please print) [illegible] STAFFORD
Name (Signature)
Address 1297 [illegible]
BOULDER CITY, NEV

✓ Name (Please print) DAVE [illegible]
Name (Signature)
Address P.O. Box 574
Boulder City NV. 89005

✓ Name (Please print) BOB BINGHAM
Name (Signature) Bob Bingham
Address 353 DESERT INN RD
LAS VEGAS, NEV 89109

✓ Name (Please print) Christine Wilke
Name (Signature) Christine L Wilke
Address 503 Cherry St
Boulder City NV

✓ Name (Please print) Diana Pontrelli
Name (Signature) Diana M Pontrelli
Address 445 Topaz Rd
L.V. Nev 89101

✓ Name (Please print) MARGARET WITTERN
Name (Signature) Margaret Wittern
Address 1E ARKANSAS
HENDERSON NEV.

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Name Leon O. Stevens
(Please print)
Name
(Signature)
Address 1077 [illegible] Dr
Camarillo Ca 93010

Name Scott STEVENS
(Please print)
Name Scott Stevens
(Signature)
Address 3425 WRIGHT RD.
CAMARILLO CA. 93010

Name CHARLES F. PAGES
(Please print)
Name Charles F. Pages O.D.
(Signature)
Address 129 EAST "L" ST.
WILMINGTON CA, 90744

✓ Name GERALD AMERSON
(Please print)
Name Gerald Amerson
(Signature)
Address 3541 EDISON AVE
L.V. NV 89121

✓ Name TERRY L. Charbonneau
(Please print)
Name
(Signature)
Address [illegible] Box 84
LAS Vegas, Nev 89124

✓ Name Don Gropp
(Please print)
Name DON GROPP
(Signature)
Address Box 10 STRT 10
L.V. NV. 89124

Name KENNETH A WYATT
(Please print)
✓ Name Kenneth A. Wyatt
(Signature)
Address 230 Dogwood
Henderson NV. 89015

Name BRAD GELARDEN
(Please print)
✓ Name Brad Gelarden
(Signature)
Address Star Route 10 BOX 100
Las Vegas NV 89124

✓ Name Richard Ham
(Please print)
Name
(Signature)
Address 649 Arroyo WAY
Boulder CITY NEV 89005

✓ Name Betty Heffley
(Please print)
Name Betty Heffley
(Signature)
Address Star Route 10, Box 58
Las Vegas, NV 89124

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Name JOHN J. SEGALE
(Please print)
Name John J Segale
(Signature)
Address 657 DEL PRADO
BOULDER CITY NEV 89005

Name J.V. LA SORELLA
(Please print)
Name
(Signature)
Address 1144 S. 6th ST
LAS VEGAS 89104

Name K. G. WEBER
(Please print)
Name Kenneth G. Weber
(Signature)
Address 531 CHERRY ST.
BOULDER CITY, NEVADA

Name T. J. HORNE
(Please print)
Name
(Signature)
Address 504 BIRCH ST.
Boulder City, NV. 89005

Name Austin Hutchon
(Please print)
Name
(Signature)
Address 75 [illegible] 16034
[illegible]
[illegible]

Name M. H. HOLLAND
(Please print)
Name M. H. Holland
(Signature)
Address 5671 N. ANNA
FRESNO, CA. 93710

Name B J PAIZ S
(Please print)
Name
(Signature)
Address 2629 [illegible] Way
Stockton, Ca 95207

Name R. S. Fleischer
(Please print)
Name R.S. Fleischer
(Signature)
Address Bx 9193
Bkfd Ca. 93389

Name Michael Hamm
(Please print)
Name
(Signature)
Address 208 Lakeshore
Boulder City NV 89005

Name [illegible]
(Please print)
Name
(Signature)
Address 268 Lakeshore
Boulder City NV 89005

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✓ Name (Please print) James W. Sprwill
Name (Signature) James W. Sprwill
Address Willow Beach Resort
Mailing Box 187 Boulder City, NV.

✓ Name (Please print) Kathleen W. Sprwill
Name (Signature) Kathleen W. Spruill
Address Willow Beach Resort
Mailing Box 187 Boulder City, NV.

✓ Name (Please print) ELIZABETH R. COCHRAN
Name (Signature) Elizabeth R. Cochran
Address 3813 HUDSON BAY
L.V. Nev. 89110

✓ Name (Please print) Loy A Owens
Name (Signature) Loy A Owens
Address 4226 N LV Blvd
North Las Vegas NV 89030

Name (Please print) DALE C. STEVENS
Name (Signature) Dal C Sten
Address 20465 COBALT St
CANOGA PARK Ca 91306

Name (Please print) C. P. BARTUS
Name (Signature) C.P. Bartus
Address 20361 GAULT ST.
Canoga Park, Calif. 91306

✓ Name (Please print) G. T. McCormack
Name (Signature)
Address 3825 E Rowe
Las Vegas Nev. 89120

Name (Please print) DONALD SKILES
✓ Name (Signature) Don W. Skiles
Address P.O. Box 187
BOULDER CITY, NV., 89005

✓ Name (Please print) LYLE THOMPSON
Name (Signature)
Address 4620 GLEN DAVIS Ln
Las VEGAS NV 89121

✓ Name (Please print) PAMELA PERRY
Name (Signature) Pamela Perry
Address Willow Beach Resort
P.O. Box 187
Boulder City, NV. 89005

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322 Lakeshore Road
Boulder City, Nevada 89005

TO BE PRESENTED TO CONGRESSMAN HARRY REID IN OCTOBER 1983

PETITION

We, the undersigned, believe the flood control plan currently in use on Lake Mead and Lake Powell is dangerously insufficient to protect the environmental, recreational and economic well-being of the entire Lower Colorado River Region. We demand that a flood control plan be adopted that will allow the full use of recreational facilities and beaches on all the lakes plus insure the safety of those businesses and individuals located along the Colorado River.

Name GEORGE L. WEST
(Please print)
Name George L. West
(Signature)
Address P.O. Box 187
Boulder City, Nev. 89005

Name FERN A. WEST
(Please print)
Name Fern A. West
(Signature)
Address P.O. Box 187
Boulder City, Nev 89005

Name Mr. & Mrs. Virgil Hedges
(Please print)
Name Mrs Virgil Hedges
(Signature)
Address 4906 Mar Vista Way
Las Vegas, Nev. 89121

Name TWYLA WINDSOR
(Please print)
Name Twyla Windsor
(Signature)
Address 4589 Sombrero Dr.
L.V. Nev. 89109

Name LAURA MILLER
(Please print)
Name Laura Miller
(Signature)
Address 1589 SOMBREROD DR
LAS VEGAS, NEV. 89109

Name Mr & Mrs. BOB ALLEN
(Please print)
Name Bob Allen
(Signature)
Address 1055 E. Flamingo
L.V. NEV. 89109

Name DONALD L. ARTERBURN
(Please print)
Name Donald L. Arterburn
(Signature)
Address Po Box 187
BOULDER CITY NV 89005

Name Barbara Finley
(Please print)
Name BARBARA FINLEY
(Signature)
Address P.O. BOX 187
BOULDER CITY NV. 89005

Name Johan L. Perry
(Please print)
Name Wayne M. Perry
(Signature)
Address PO Box 187
Boulder City Nv 89005

Name Geneva M. Escoffier
(Please print)
Name Geneva M. Escoffier
(Signature)
Address P.O. Box 757
Boulder City, Nev 89005
(Willow Beach, Ariz.)

Please mail completed petitions to: Playmate Resort Marinas
322 Lakeshore Road
Boulder City, Nevada 89005

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Name Rick Canalos.
(Please print)
Name Manolo.
(Signature)
Address 3663 Figueroa St.
La Canada Flintridge Cal.

Name Eric Allen Smith
(Please print)
Name Eric allen Smith
(Signature)
Address PO BOX 187 boulder city
NV 89005, willow Beach Resort

✓ Name William W. SHARP
(Please print)
Name William W. Sharp
(Signature)
Address 5317 Eugene Av
La Vegas Nev 89108

✓ Name WANETTA SHARP
(Please print)
Name 5317 EUGENE AVENUE
(Signature)
Address LAS VEGAS NEVADA 89108

Name MICHAEL R. STARK
(Please print)
Name
(Signature)
Address 1911 GATES AVE
REDONDO BEACH, CA 90278

Name THOMAS B. PREECE
(Please print)
Name Thomas B. Preece
(Signature)
Address 3800 N. BRADFORD #327
LA VERNE, CALIF. 91750

Name Joe CAMPBELL
(Please print)
Name Joseph L Campbell
(Signature)
Address P.O. Box 187 BOULDER CITY, NV
WILLOW BEACH RESORT, 89005

Name ROBERT G. MILLER
(Please print)
✓ Name Robert G. Miller
(Signature)
Address 4164 MISSISSIPPI
LAS VEGAS, NEV. 89103

✓ Name MR & MRS Wm MILLER
(Please print)
Name William Miller
(Signature)
Address 146 CERVANTES St.
LAS VEGAS, NEV. 89101

✓ Name Mr & Mrs R. Knickerbocker.
(Please print)
Name Ralph C. Knickerbocker.
(Signature)
Address 1481 S. Palm Sp #118
Las Vegas, Nev. 89104

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Name KEN RODGERS
(Please print)
Name Ken Rodgers
(Signature)
Address 939 Apple Blossom
PRESCOTT, ARIZONA 86301

Name RALPH BONANG
(Please print)
Name SYLVIA BONANG
(Signature)
Address 1911 YOSEMITE Dr
Los Angeles, Calif 90041
Sylvia Bonang

✓ Name Burton N. Pinkham
(Please print)
Name Burton N Pinkham
(Signature)
Address 205- Rosemeade St.
Las Vegas, NV. 89106

Name CONRAD K. NELSON
(Please print)
Name Conrad K. Nelson
(Signature)
Address 2500 SNAVELY St.
KINGMAN AZ.

Name Harry Seibert
(Please print)
Name HARRY SEIBERT
(Signature)
Address 102 S. CORTEZ
MARGATE FL 33068

Name LORETTA Nichols
(Please print)
✓ Name Loretta Nichols
(Signature)
Address 1293 Lynwood
Boulder City, Nev. 891[illegible]

Name KENNETH D. NICHOLS SR
(Please print)
✓ Name Kenneth D. Nichols Sr.
(Signature)
Address 1293 Lynwood
Bouldercity, NV 89005

Name LEO RABENALDT
(Please print)
✓ Name Leo Rabenaldt
(Signature)
Address 653 MT. Blackburn
Boulder City Nev 89005

Name Evelyn Rabenaldt
✓ (Please print)
Name Evelyn Rabenaldt
(Signature)
Address 653 Mt Blackburn Way
Boulder City, NV. 89005

Name Robert W Hart
(Please print)
Name Robert W. Hart
(Signature)
Address 2435 So Jamaica Blvd So.
Lake Havasu City AZ 86403

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Name Patricia A. Simmers
(Please print)
Name
(Signature)
Address 3927 E. 2nd Ave.
Hialeah Fl. 33013

✓ Name Audrey W. Webb
(Please print)
Name Audrey W. Webb
(Signature)
Address 1292 Shenandoah
Boulder City NV 89005

Name GALE LE SHTY
(Please print)
Name
(Signature)
Address 4041 N 61st AVE
PHX, AZ 85033

Name H.E. Youngstrand
(Please print)
Name H.E. Youngstrand
(Signature)
Address Las Vegas, Nev - 89108

✓ Name MARGARET WEYMAN
(Please print)
Name Margaret Weyman
(Signature)
Address 5850 Silver Dollar #3
Las Vegas, Nv. 89102

Name ROBERT BROWN
(Please print)
✓ Name Robert Brown
(Signature)
Address 3383 DUCHESS
L.V. NV 89121

✓ Name Renée Lusiani
(Please print)
Name Renee Lusiani
(Signature)
Address 3501 Maryland
LV Nevada 89109

Name Thomas D. EVANS
✓ (Please print)
Name Thomas D Evans
(Signature)
Address 1413 Exley
LAS Vegas NEV. 89104

Name Bobby Condor
✓ (Please print)
Name Bobby Condor
(Signature)
Address Box 187
BOULDER CITY NV.

Name ROBT N CHAYTOR
(Please print)
✓ Name R N Chaytor
(Signature)
Address 3684 Antigua Ave
L.V. NEV 89121

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Name ROBERT HILBERT JR
(Please print)
Name Hilbert Jr
(Signature)
Address Callville Bay marina
Las Vegas 89124

Name NANCY L. BEYER
(Please print)
Name Nancy L. Beyer
(Signature)
Address 6007 Bromley
LAS VEGAS, NV. 89107

Name JUDITH P. HAMMER
(Please print)
Name Judith P. Hammer
(Signature)
Address 525 Harris #1319
Henderson, Nv. 89015

Name GARY THEOBALD
(Please print)
Name
(Signature)
Address PO Box 18432-64
LAS VEGAS, NV 89114

Name PAUL W. PIECKE
(Please print)
Name
(Signature)
Address SP 19 ST RT 10
LAS VEGAS NV. 89124

Name Marie Collins
(Please print)
Name marie collins
(Signature)
Address 156 C Judy Lane - 564-1787
PO Box 909 Henderson NV 89015

Name CHRISTINE QUIGLEY
(Please print)
Name Christine Quigley
(Signature)
Address Star Rt 10 Sp #61
L.V., Nv. 89124

Name JAMES MORRIS
(Please print)
Name James Morris
(Signature)
Address St Rt 10 Box 62
Las Vegas Nv 89124

Name Harold + Jeri Lovin
(Please print)
Name Harld + Jeri Lovin
(Signature)
Address Star Rt 10 Sp 95
Las Vegas, Nv 89124

Name DONALD G MORRIS
(Please print)
Name Donald G Morris
(Signature)
Address Box 62 R 10
LAS VEGAS NV.

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Name Lowell R Moody
(Please print)
✓ Name Lowell R Moody
(Signature)
Address 620 Del PRADO DR
Boulder City Nv 89005

Name MARY B Moody
✓ (Please print)
Name Mary B Moody
(Signature)
Address 620 DeL PRADO DR
Boulder City, NV 89005

✓ Name PAMELA KLAMP
(Please print)
Name Pamela K Lamp
(Signature)
Address 6099E Carlsbad
L.V., NV 89110

Linda Giannosa
Name Linda Giannosa
(Please print)
✓ Name Linda Giannosa
(Signature)
Address 215 Woodley St
Las Vegas NV 89106

Name FRANK GIANNOSA
✓ (Please print)
Name Frank Giannosa
(Signature)
Address 215 WOODLEY
LAS VEGAS NV 89106

Name [illegible]
(Please print)
Name Marilyn [illegible]
(Signature)
Address 1418 Bronco Rd
Boulder City Nevada

Name NOEL P. R. Biggs
(Please print)
Name Noel P R Biggs
(Signature)
Address 433 Tiger Lily av.
Hen. NV. 89015

Name THOMAS M. HAMPTON
(Please print)
✓ Name Thomas M. Hampton
(Signature)
Address 4842 PALACIO
LAS VEGAS, NEV. 89122

Name Linda Martinez
✓ (Please print) Linda Martinez
Name
(Signature)
Address 6700 E Russell Rd. #266
Las Vegas, Nv 89122

Name YVONNE WATSON
(Please print)
✓ Name Yvonne Watson
(Signature)
Address 4367 E. CAREY
L.V. NEV. 89115.

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Name (Please print) CINDY CHANDLER
Name (Signature) Cindy Chandler
Address 1409 Monterey Dr
B.C NV 89005

Name (Please print) LAURA HARDY
Name (Signature) Laura Hardy
Address 1409 Monterey Dr
BC NV 89005

Name (Please print) Brad D. Bode
Name (Signature) Brad D. Bode
Address 3412 Paradise Pl.
Las Vegas, Nv. 89109

Name (Please print) Thelma Button
Name (Signature) Thelma Button
Address 101 Magnesium St
Henderson, Nevada 89015

Name (Please print) Ronnie Mann
Name (Signature) Ronnie Mann
Address 2028 N. Bassler #A

Name (Please print) Wayne Good
Name (Signature) Wayne Good
Address 704 [illegible] St BC.

Name (Please print) Patricia A. Fraser
Name (Signature) Mark Fraser
Address 1017 #7 Lisbon St.
L.V. N.V. 89109

Name (Please print) Ann Madsen
Name (Signature) Ann Madsen
Address PO Box 957
Henderson NV 89015

Name (Please print) R. Palmer
Name (Signature) 4204 El Cedral LV NV 89103
Address

Name (Please print) Mrs. Pat Healey
Name (Signature) Pat Healey
Address 303 Heather Dr.
Henderson, Nev.

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Name ~~[illegible] Lucido~~
(Please print)
Name ~~3140 E. [illegible] Dr~~
(Signature)
Address

Name BONNIE Lucido
(Please print)
Name Bonnie M Lucido
(Signature)
Address 3140 E. Sonata Dr
LV, NV 89121

Name Robert Lucido
(Please print)
Name Robert Lucido
(Signature)
Address 3140 E. Sonata Dr.
LV, NV 89121

Name L. Francis
(Please print)
Name 4155 Vegas Valley Dr.
(Signature)
Address L. V. Nev. 89121

Name Rick Mendoza
(Please print)
Name Rick Mendoza
(Signature)
Address 1308 CAPRI #A
Boulder City, Nv. 89005

Name Ernest M. Kovats
(Please print)
Name Ernest M. Kovats
(Signature)
Address 1700 Loch Lomond way
Las Vegas, Nevada 89102

Name Stella Kovats
(Please print)
Name Stella C. Kovats
(Signature)
Address 1700 Loch Lomond way
Las Vegas Nevada 89102

Name Mrs W. R Imel
(Please print)
Name WALTER Imel
(Signature)
Address St. Louis. Mo.

Name Russell H. Kemp Jr
(Please print)
Name Russell H Kemp J.
(Signature)
Address 1503 Irene Dr
Boulder City Nev 89005

Name Douglas Johnson
(Please print)
Name Douglas Johnson
(Signature)
Address 1520 DELLA Court
293-7910

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Name Mr & Mrs S. Sturdevant
(Please print)
Name Mr & Mrs S. Sturdevant
(Signature)
Address 1811 Via Amorosa #3
Rowland Hts CA 91748

Name Doug Tomlinson
(Please print)
Name Doug TOMLINSON
(Signature)
Address 33241 CHRISTINA DR.
DANA PT. CA, 92629

Name Dian Tomlinson
(Please print)
Name Deanna Tomlinson
(Signature)
Address 33241 Christina
Dana Point, CA 92629

Name IRWIN E. ANDERSON
(Please print)
Name [illegible]
(Signature)
Address 9205 [illegible]
South Gate Ca - 90280

Name E. Wallace.
(Please print)
Name 9219 San Vicente
(Signature)
Address So Gate Cal

Name MR & MRS. Gary Spurlock
(Please print)
Name Renee Spurlock
(Signature)
Address 14582 Raintree Ln.
Tustin Calif 92680

Name RICHARD KEAUH SR
(Please print)
Name [illegible] Jr
(Signature)
Address 3317 BROCKHILL
LA CRESCENTA CA 91214

Name Randy Carlson
(Please print)
Name Randell Carlson Jr
(Signature)
Address 814 E. Marconi Phx.
Ariz. 85022

Name Ed Carlson
(Please print)
Name Ed Carlson
(Signature)
Address 814 E Marconi Ave
Phoenix AZ 85022

Name BARBARA J RICHARDS
(Please print)
Name Barbara J Richards
(Signature)
Address 6255 ADENMOOR COURT
LAS VEGAS, NV, 89110

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Name Susan Gardner
(Please print)
Name Susan G Gardner
(Signature)
Address 6255 Adenmoor Ct.
Las Vegas. NV 89110

Name Karen Hayes
(Please print)
Name Karen A Hayes
(Signature)
Address 6342 Goldmine Dr
Las Vegas. NV 89115

Name Bill IVERSON
(Please print)
Name
(Signature)
Address 4842 IMPERIAL
LAS VEGAS NEVADA

Name Sherry Iverson
(Please print)
Name Sherry Iverson
(Signature)
Address 4842 Imperial Ave.
Las Vegas, NV. 89104

Name Carmen DeLuna
(Please print)
Name Carmen De Luna
(Signature)
Address 8291 Santa Elvira
Buena Park Cal 90620

Name JOHN HART
(Please print)
Name John Hart
(Signature)
Address 759 HAVERFORD
PACIFIC PALISADES, CA
90272

Name NANCY CROPSEY
(Please print)
Name Nancy L. Cropsey
(Signature)
Address P.O. Box 2502
San Bernardino, Ca.
92406

Name RAYMOND CROPSEY
(Please print)
Name Raymond K. Cropsey
(Signature)
Address P.O. Box 2502
San Bernardino, Ca.
92406

Name EDWARD A APFELBAUM
(Please print)
Name
(Signature)
Address 4818 LONGFORD ST
S.D CALIF 92117

Name LOUIS DE LUNA
(Please print)
Name Louis De Luna
(Signature)
Address 8291 SANTA ELVIRA
BUENA PARK, CAL -

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Name ~~Pat~~ Patricia Henne
(Please print)
Name Patricia Henne
(Signature)
Address 1971 - Kurtz St.
Oceanside CA 92059.

Name Eddie Martinez
(Please print)
Name Eddie Martinez
(Signature)
Address 5844 Willow
Baldwin Park CA. 91706

Name FRANCIS L. Rhodes
(Please print)
Name Francis L Rhodes
(Signature)
Address 19014 Delight St.
CANYON Country Calif. 91351

Name CHARLES R BUTCHER
(Please print)
Name Charles R Butcher
(Signature)
Address 3339 PINE AVE
LONG BEACH, CALIF 90806

Name Donald W [illegible]
(Please print)
~~Name~~ 3526 TULINNA AVE L.B
(Signature)
Address CAL.F 90808

Name ALAN ADAM
(Please print)
Name Alan Adam
(Signature)
Address 5628 Olive Ave
Lakewood Ca. 90712

Name ROBERT BUTCHER
(Please print)
Name Robert Butcher
(Signature)
Address 2505 PALM DR.
SIGNAL Hill CA 90806

Name Roy K. Welty
(Please print)
Name Roy K. Welty
(Signature)
Address 6431 Fairbrook ST
Long Beach, CA. 90815

Name TERRENCE A. FELL
(Please print)
Name
(Signature)
Address 110 E 30th ST.
NEWPORT BEACH, CA. 92663

Name Bill WELTZ
(Please print)
Name Bill Weltz
(Signature)
Address 3446 El Dorado Drive
Long Beach Calif.

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DONALD R. DAVIS
Name ~~D[illegible]~~ Dai
(Please print)
Name Donald R Dai
(Signature)
Address 2252 Chamwood
EL TORO, CA

Name Roberta Haley
(Please print)
Name Roberta Haley
(Signature)
Address 10226 Ocatillo Dr
Sun City, AZ 85373

Name FLOYD E ANGUS
(Please print)
Name Floyd E Angus
(Signature)
Address 15930 Amwellen St
HACIENDA HTS Cal.
91745

Name ~~George S Murphy~~
(Please print)
Name
(Signature)
Address

Name GEORGE Murphy
(Please print)
Name George Murphy
(Signature)
Address 2575 E 21st St
Long Beach, Ca 90810

Name ~~Laurel~~ Lo LAUREL LOUCKS
(Please print)
Name Laurel Loucks
(Signature)
Address 4765 Tracy
Kingman 86401

Name K.W. LOUCKS
(Please print)
Name Kenneth Loucks
(Signature)
Address 4765 Tracy Lane
Kingman

Name SALLY WELTZ
(Please print)
Name Sally Weltz
(Signature)
Address 3446 EL DORADO DR.
Long Beach, Ca. 90808

Name Ken DePesa
(Please print)
Name Ken DePesa
(Signature)
Address 1471 Kurtz st
Oceanside Ca 92054

Name JoAnn BRAdley
(Please print)
Name 719 GlAdys Ave
(Signature) Long Beach, CA 90804
Address

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Name William T. HARDEN
(Please print)
Name Wm T. Harden
(Signature)
Address 849 CRUMLEY ST
WEST COVINA, CAL
(213) 962-0802

Name MIKE STEINER
(Please print)
Name
(Signature)
Address 470 MIRA LOMA DR
AZUSA 91702
1-213- 334031

Na[illegible] Patelli
[illegible]int)
[illegible]nature)
Address 13774 Lomitas Ave
LA Puente Calif
(213) 961-4947

Name DALE TRISTAD
(Please print)
Name David R Tristad
(Signature)
Address 118 N. BARBARA
AZUSA CA

Name Chuck Clark
(Please print)
Name Chuck Clark
(Signature)
Address 4300 Alderson
Baldwin Park Ca. 91706

Name DAVID G CALDERWOOD
(Please print)
Name David G. Calderwood
(Signature)
Address 708 Via Los SANTOS
SAN DIMAS CALIF
(714) 599-6678

Name ROBERT F. OPPERMANN
(Please print)
Name
(Signature)
Address 16703 SAUSALITO DR
WHITTIER CAL. 90603
213-697 1032

Name Robert KNOWLTON
(Please print)
Name
(Signature)
Address 158 EAST Rd
LA HABRA 90631
213 6973022

Name DON HUBBELL
(Please print)
Name
(Signature)
Address 4900 EMERALD AVE.
LA VERNE CALIF 91750
714 5949333

Name Lee Clark
(Please print)
Name Lee Clark
(Signature)
Address 413 S 3rd.
La Puente, Ca 91746

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Name W. E. ANGUS
(Please print)
Name W E Angus
(Signature)
Address 4360 Shirley
Lynwood, Ca 90262

Name RUTH M ANGUS
(Please print)
Name Ruth M. Angus
(Signature)
Address 4360 Shirley
Lynwood, Ca 90262

Name TRACEY ANGUS
(Please print)
Name Tracey Angus
(Signature)
Address 15930 AnnEllen
Hacienda Hts, CA

Name FLOYD E ANGUS
(Please print)
Name Floyd E. Angus
(Signature)
Address 15930 ANNELLEN
Hacienda Hts, Ca

Name SHANNON ANGUS
(Please print)
Name Shannon Angus
(Signature)
Address 7772 S.E. Clackamus
Milwaukee Oregon

Name ROBERT MARKOVIC
(Please print)
Name 11045 CARSON DR
(Signature) Robert Markovic
Address
11045 Carson Dr
Lynwood .Ca 90262

Name FLORBA MARKOVIC
(Please print)
Name Florba M. Markovic
(Signature)
Address 11045 Carson dr
Lynwood, ca 90262

Name EARL ANGUS
(Please print)
Name Earl Angus
(Signature)
Address 7772 S.E. Clackamus
Milwaukee Oregon

Name SEAN ANGUS
(Please print)
Name Sean Angus
(Signature)
Address 7772 S.E. Clackamus
Milwaukee Oregon

Name PATRICA ANGUS
(Please print)
Name 7772 Patricia Angus
(Signature)
Address 7772 S E Clackamus
Milwauke Oregon

Please mail completed petitions to: Playmate Resort Marinas
322 Lakeshore Road
Boulder City, Nevada 89005

TO BE PRESENTED TO CONGRESSMAN HARRY REID IN OCTOBER 1983

PETITION

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Name Barbara Hallack
(Please print)
Name Barbara Hallack
(Signature)
Address Box 985
Boulder City, NV 89005

Name FR. Dale Hallack
(Please print)
Name Fr. Dale Hallack
(Signature)
Address Box 985
BOULDER CITY, NV. 89005

Name Mona Innerbichler
(Please print)
Name Mona Innerbichler
(Signature)
Address 11325 Elmcroft ave
Norwalk, California 90650

Name Richard Bernard
(Please print)
Name Richard Bernard
(Signature)
Address 11712 Cantel St
Santa Fe Springs, Calif. 90670

Name Robert F Burnett Jr
(Please print)
Name Robert F Burnett Jr
(Signature)
Address 857 Valley Court
La Canada, Ca 91011

Name Bill Sidney
(Please print)
Name Bill Sidney
(Signature)
Address 3 Calabria
Irvine, CA 92714

Name DICK WALLACE
(Please print)
Name
(Signature)
Address 9928 CEDAR CT
CYPRESS, CAL 90630

Name ~~Michele Angus~~
(Please print)
Name ~~Michele Angus~~
(Signature)
Address ~~159~~ [illegible]

Name Michele Angus
(Please print)
Name Michele Angus
(Signature)
Address 15930 Annellen St
Hacienda Heights Cal.

Name Deborah R. Angus
(Please print)
Name Deborah R. Angus
(Signature)
Address 15930 ANN ELLEN
Hacienda Hgts, Ca
91745

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Check

Name KATE GRAEF
(Please print)
Name Kate Graef
(Signature)
Address 5515 Sandburg ave.
San Diego, Ca. 921220

Name M Marriott
(Please print)
Name M MARRIOTT
(Signature)
Address 1401 MINTE VISTA

Name MARK MARRIOTT
(Please print)
Name Mark Marriott
(Signature)
Address 220 COSTA MESA
COSTAMESA CA. 92627

Name John Irving
(Please print)
Name John Irving
(Signature)
Address 323 Loma Linda Dr.
Ana. Calif. 92804

Name Robert K Derigo
(Please print)
Name Robert K Derigo
(Signature)
Address 1040 Lido St
Anah CA 92801

Name DELLA GASTON
(Please print)
Name Della Marie Gaston
(Signature)
Address STRT2 Box 747M
Yucca Valley Cal 92284

Name PHYLLIS DERIGO
(Please print)
Name Phyllis Derigo
(Signature)
Address 1040 LIDO ST
ANAHEIM, CALIF 92801

Name Joe Nock-
(Please print)
Name Joe NOCK-
(Signature)
Address 3430 E Tropicana #44
Las Vegas nev - 89121

Name Leta Nock
(Please print)
Name Leta Nock
(Signature)
Address 3430 E Tropicana #44
Las Vegas nev 89121

Name SHARON A. LAY
(Please print)
Name Sharon A. Lay
(Signature)
Address 3111 IMPINK PL.
JAMUL, CA 92035

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Name DENISE BRight
(Please print)
Name Denise Bright
(Signature)
Address 9116 Chaney
Downey, Ca 90240

Name DAVID BRight
(Please print)
Name David Bright
(Signature)
Address 9116 Chaney
Downey Ca 90240

Name MATTHEW BRIGHT
(Please print)
Name Matt Bright
(Signature)
Address 9116 Chaney
Downey Ca 90240

Name Jeremy Bright
(Please print)
Name Jeremy Bright
(Signature)
Address 9116 Chaney
Downey, Ca 90240

Name CHRISTINE Bright
(Please print)
Name Christine Bright
(Signature)
Address 9116 Chaney
Downey, Ca 90240

Name RichARD MADISON
(Please print)
Name Richard Madison
(Signature)
Address 2938 Norwood dr
Rowland Hts, Ca

Name Judith Madison
(Please print)
Name Judith Madison
(Signature)
Address 2938 Norwood dr
ROWLAND HTS, CA

Name HEATHER MADISON
(Please print)
Name Heather Madison
(Signature)
Address 2938 Norwood dr
Rowland Hts, Ca

Name JOY MADISON
(Please print)
Name Joy Madison
(Signature)
Address 2938 Norwood dr
Rowland Hts, Ca

Name Gary and Myrna Solmi
(Please print)
Name Gary Solmi & Myrna Solmi
(Signature)
Address 1470 [illegible] Ln
[illegible] City
90360

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Name JACK E. WERK
(Please print)
Name Jack E. Werk
(Signature)
Address 7320 N. BARRANCA
GLENDORA CAL 91740

Name Donna Dodson
(Please print)
Name Donna Dodson
(Signature)
Address 5413 Chino dr. GRSK
Kingman, Ariz. 86401

Name John Dodson
(Please print)
Name
(Signature)
Address 5413 Chino DR GRSR
Kingman Az 86401

Name ROBERT F. DENTON
(Please print)
Name Robert F. Denton
(Signature)
Address 13922 YANKTON WAY
WESTMINSTER CA. 92683

Name JOSEPH C. SHERBURN
(Please print)
Name Joseph C Sherburn
(Signature)
Address 464 PAULETTE PL
LA CANADA CA 91011

Name Amy S. Sherburn
(Please print)
Name Amy S. Sherburn
(Signature)
Address 464 Paulette Pl.
La Canada, CA 91011

Name FRANK DUDENHOEFFER
(Please print)
Name Frank Dudenhoeffer
(Signature)
Address 4859 OAKWOOD
LA CANADA CA 91011

Name Tom Dudenhoeffer
(Please print)
Name
(Signature)
Address 4859 Oakwood
La Canada Ca.

Name H. JAMES HOLROYD
(Please print)
Name H. James Holroyd
(Signature)
Address P.O. BOX 6
LA CANADA, CA 91011

Name William Kelly
(Please print)
Name Wm Kelly
(Signature)
Address 4827 ALMINAR
LA CANADA CA 91011

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Name NELS CASSANO
(Please print)
Name Nelso Cassano
(Signature)
Address 23786 VILLENA
MISSION VIEJO CA
92692

Name Wm. BURKE
(Please print)
Name W. M. Burke
(Signature)
Address 23762 Villena
Mission Viejo Calif. 92692

Name Dorothea Burke
(Please print)
Name Dolly Burke
(Signature)
Address 23762 Villena
Mission Viejo Calif 92692

Name B. Rhea Woodall
(Please print)
Name Rhea Woodall
(Signature)
Address 1901 E. Missouri #103
Phoenix, Ariz 85016

Name C.N. Cherry
(Please print)
Name C N Cherry
(Signature)
Address 1714 W Heatherbrae
Phoenix Az 85015

Name Betty G Cherry
(Please print)
Name Bettie G. Cherry
(Signature)
Address 1714 W. Heatherbrae
Phx, Az 85015

Name Jean L. Wilson
(Please print)
Name Jean L. Wilson
(Signature)
Address P.O. Box 4908
Canyon Lake, Ca 92380

Name
(Please print)
Name Robeat L. Atkinson
(Signature)
Address 5531 CERULEAN
Garden Grove, CA 92645

Name Donald C Richter
(Please print)
Name DONALD C RICHTER
(Signature)
Address 6237 #D BISFORD
BELL CA 90201

Name Leonard Williams
(Please print)
Name Leonard T Williams
(Signature)
Address 3035 Ames Ave.
Kingman AZ

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Name B. V. Yates
(Please print)
Name B. V. Yates
(Signature)
Address Box 134
Dolan Springs, Az. 86441

Name Veronica Smith
(Please print)
Name Veronica Smith
(Signature)
Address 6891 Kenyon Ave
Hesperia, Ca 92345

Name Diana Whitney
(Please print)
Name Diana Whitney
(Signature)
Address 8988 Hope Ave
RIVERSIDE, CA 92503

Name ROSE Pollock
(Please print)
Name Rose Pollock
(Signature)
Address 3922 Glenridge Rd.
Fayetteville, N.C 28304

Name W. DUANE MUCKRIDGE
(Please print)
Name W. Duane Muckridge
(Signature)
Address 4811 5TH ST
RAINBOW CA.

Name JAMES R LANG
(Please print)
Name James R Lang
(Signature)
Address 5448 5th St
Fallbrook CA. 92028

Name James R Pellandu
(Please print)
Name
(Signature)
Address 5031 2nd St
FallBrook Ca 92028

Name DWIGHT S RINER
(Please print)
Name Dwight S Riner
(Signature)
Address 2401 country PK DR
Prescott az 86301

Name David Ward
(Please print)
Name DAVID WARD
(Signature)
Address 146 COLBATH L.V. NEV.

Name JEFFREY MORGAN
(Please print)
Name Jeffrey Morgan
(Signature)
Address 404 LONGTREE
Las Vegas, Nevada 89015

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Name TOM STRATTON
(Please print)
Name Tom Stratton
(Signature)
Address 1667 LARK LN.
CORONA CA.

Name Bobby Stratton
(Please print)
Name Bobby Stratton
(Signature)
Address 1667 Lark Lane
Corona, Calif.

Name WILLIAM L STOUT
(Please print)
Name
(Signature)
Address 2020 BRENTWOOD
WEST COVINA CA 91742

Name JAN BENTLEY
(Please print)
Name Jeanette Bentley
(Signature)
Address 1604 MERION WAY
Seal Beach, Ca. 90741

Name Debbe Hutchinson
(Please print)
Name Debbe Hutchinson
(Signature)
Address 21732 Palos Verdes Blvd
Torrance, CA 90503

Name HANS PROROK
(Please print)
Name Hans P Prorok
(Signature)
Address 2400 E LINCOLN
ANAHEIM, CA 92806

Name Darlene GREER Dup
(Please print)
Name Darlene Greer
(Signature)
Address 2627 S. Lamb blvd
Las Vegas, Nev 89115-

Name L. Kurt
(Please print)
Name L. Kurt
(Signature)
Address 2205 S Shelton
Santa Ana Calif.

Name MC Bondy
(Please print)
Name M. C. BONDY
(Signature)
Address 1014 Corte Maria
C.V., Ca- 92011

Name A. WALKER
(Please print)
Name
(Signature)
Address 21128 Lochmoor
H.W. Mi. —

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Name WILLIS E SMITH III
(Please print)
Name Willis E Smith III
(Signature)
Address 5237 FAIRFAX CR.
LAS VEGAS, NEV. 89120

Name Glenn Kitzman
(Please print)
Name Glenn Kitzman
(Signature)
Address 3410 Death Valley
Las Vegas Nev. 89122

Name Linda U. Vermilyea
(Please print)
Name Linda U. Vermilyea
(Signature)
Address 5944 N 83 Street
Scottsdale, AZ. 85253

Name Anthony Bolognese
(Please print)
Name
(Signature)
Address
L. V. NV.

Name Dana Randall
(Please print)
Name Dana Randall
(Signature) 11202 ELKHORN ST
Address Santa Fe Springs, Ca.
90670

Name Ken M. Sharp
(Please print)
Name Ken M. Sharp
(Signature)
Address Star Rt #2 Box 681
Yucca Valley, Calif 92284

Name GEORGE PECORARO.
(Please print)
Name
(Signature)
Address 1380 MADRID ST.
Las Vegas, NV 89121

Name MIMI MCGEE
(Please print)
Name Mimi McGee
(Signature)
Address 1517 Cayuga PKWY
Las Vegas, NV 89109

Name David Smith
(Please print)
Name
(Signature)
Address 6891 Kenny Ave.
Reseda Calif.

Name Richard Bernard
(Please print)
Name RICHARD BERNHARD
(Signature)
Address 11712 Garetal St
SFS CA 90670

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Name FRANK L. TRAYNOR
(Please print)
Name Frank L. Traynor
(Signature)
Address 1230 Aldersgate Dr.
La Verne Ca. 91750

Name Jeffrey M. Sohler
(Please print)
Name Jeffrey M. Sohler
(Signature)
Address 1344 FAIR Wy
S.A. CA 92706

Name RICHARD W. WOLFE JR
(Please print)
Name Richard W. Wolfe
(Signature)
Address 10313 MIRANDA AVE
BUENA PARK, Calif. 90620

Name HARVEY F. KIRBY
(Please print)
Name Harvey F. Kirby
(Signature)
Address 157 N. OAK TREE DR.
GLENDORA, CALIF 91740

Name Ralph F Miller
(Please print)
Name Ralph F Miller
(Signature)
Address 15329 Del Prado Dr.
Hacienda Heights Calif 91745

Name ROBERT J GRASS
(Please print)
Name Robert J Grass
(Signature)
Address 1941 N. SANTA ANITA
So. EL MONTE, CA 91733

Name Christine KASLAVAGE
(Please print)
Name Christine Kaslavage
(Signature)
Address 3835 N 36th St #301
Phx Arz 85016

Name Rene Gregory
(Please print)
Name René Gregory
(Signature)
Address 3835 N 36th St #301
Phx Arz

Name Jeff Young
(Please print)
Name Jeff Young
(Signature)
Address 3835 N 36th St #301
Phx Arz 85016

Name Jon Hatterman
(Please print)
Name Jon Hatterman
(Signature)
Address 4421 W Tierra Buena
Glendale Arz 85306.

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Name Robert & Dawn Patison
(Please print)
Name Robert & Dawn Parison
(Signature)
Address 6493 Ave Juan Diaz
Riverside, CA 92509

Name JOHN BROWER
(Please print)
Name John Brower
(Signature)
Address 181 Pineview
Irvine Ca. 92714

Name C W Huffman
(Please print)
Name O. W Huffman
(Signature)
Address 3460 Hedges Rd.
Kingman Az. 86441

Name W R HARVEY
(Please print)
Name
(Signature)
UTAH
Address 8765 900 E
SPANISH FORK

Name Marlene R Ray
(Please print)
Name Marlene R. Ray
(Signature)
Address 6141 E. San Cristobal
Tucson, Arizona

Name Althea Hummer
(Please print)
Name Althea Hummer
(Signature)
Address PO Box 547
Temple Bar Az

Name George C Hummer
(Please print)
Name George C Hummer
(Signature)
Address P.O. Box 547
Temple Bar Ariz 86443

Name TERRI HALE
(Please print)
Name Terri Hale
(Signature)
Address 1901 SPRING LAKE DR
HENDERSON NV 89015

Name Ann M. Lafan
(Please print)
Name ANNE M LAFAR
(Signature)
Address 1901 Spring Lake Dr.
Henderson Nv. 89015

Name Dennis Pecce
(Please print)
Name Dennis M Pecce
(Signature)
Address 441 N WILSON
LAHABRA CA

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Name (Please print) Robert A Spaulding
Name (Signature) R A Spaulding
Address 9040 Ocean View
Whittier, CA.

Name (Please print) THERESA R. HATLEY
Name (Signature) Theresa R Hatley
Address P.O. Box 331
Temple Bar, Az. 86443

Name (Please print) PAUL HODGE
Name (Signature) Paul Hodge
Address 537 LA SENA
WEST COVINA CA 91790

Name (Please print) Mr & Mrs Mack E Miller
Name (Signature) MR & MRS MACK E. MILLER
Address Box 516
TEMPLE BAR, ARIZONA-86443

Name (Please print) Henry F. Gilbertson
Name (Signature) Henry F. Gilbertson
Address 2601-Colanthe Ave
Las Vegas, NV 89102

Name (Please print) HARRY J PROCTOR
Name (Signature) Harry J Proctor
Address 3107 PRESCOTT LANE
HOLIDAY, FLA 33590

Name (Please print) Helen Price
Name (Signature) Helen Price
Address 3107 PRESCOTT LA
Holiday FLA. 33590

Name (Please print) MRS W. R Asbell
Name (Signature) Mrs WR Asbell
Address Wolf Creek Rd
Casper Wyo 82604

Name (Please print) Mrs DH McElreath
Name (Signature) Mrs DH McElreath
Address 521 Thelma Dr
Casper Wyo 82609

Name (Please print) MRS R C HATTER
Name (Signature) Mrs. R C Hatter
Address 2746 S. Desert Ridge
Green Valley, Ariz
85614

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Name CATHI RHODES
(Please print)
Name
(Signature)
Address 19014 DELIGHT ST.
CANYON COUNTRY, CA 91351

Name JACK LUNDY
(Please print)
Name
(Signature)
Address 570 Dundas St. W.
Hamilton Ont. L9J 1B4

Name ED NEWCOMB
(Please print)
Name Ed Newcomb
(Signature)
Address 15336 Andorra Way
San Diego, Ca. 92129

Name D Molyneaux
(Please print)
Name David Molyneaux
(Signature)
Address 2309154th St
Gardena, Ca 90249

Name
(Please print)
Name
(Signature)
Address 230915 54. st
Gardena Ca, 90219

Name KATHLEEN M. STARK
(Please print)
Name Kathleen M Stark
(Signature)
Address 254 CARLO DRIVE
GOLETA, CA 93117

Name GEORGE F. STARK
(Please print)
Name George F. Stark
(Signature)
Address 254 CARLO DRIVE
GOLETA, CA 93117

Name D.E. BRADLEY
(Please print)
Name D.E. Bradley
(Signature)
Address P.O. Box 939
Henderson Nev 89015

Name Lee Black
(Please print)
Name
(Signature)
Address 1000 Hilltop Dr.
Kingman AZ 86401

Name
(Please print)
Name Box 757
(Signature)
Address Boulder City, NV
89005

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✓ Name (Please print) Jim Clark
Name (Signature) Jim Clark
Address 3921 Vista Largo
LV. Nev 89121

Name (Please print) ROSEMARY STONE
Name (Signature) Rosemary Stone
Address 18407 Parkvalle Ave
Cerritos Calif 90701

Name (Please print) FRED L STONE
Name (Signature) Fred L Stone
Address 18407 PARKVALLE Ave
Cerritos, Cal. 90701

Name (Please print) Tim Galvin
Name (Signature) TIM GALVIN
Address 696 Red Lake Wy
Las Vegas Nev 89110

Name (Please print) Michael S. Holmstrom
Name (Signature)
Address 2311 CASCADE ST
LAS Vegas, NV, 89122

Name (Please print) Alice Galvin
Name (Signature) Alice S. Gal
Address 686 Red Lake
L.V. NV. 89110

Name (Please print) Donna Stratton
Name (Signature) Donna Stratton
Address 1667 Lark Ln
Covina, Ca 91720

Name (Please print) Katie Hanneman
Name (Signature) Katie Hanneman
Address 5848 Huntdale
90808 LONG Beach Ca.

Name (Please print) MICHAEL J. HANNEMAN
Name (Signature) Michael J Hanneman ~~5848 Huntdale~~
Address 5848 HUNTDALE St
Long BEACH CALIF 90808

Name (Please print) Barbara S. Hanneman
Name (Signature) Barbara S. Hanneman
Address 5848 Huntdale
Long Beach, Ca 90808

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Name Tom Hutchinson
(Please print)
Name
(Signature)
Address 21732 P.V. BLVD.
TORRANCE, CA. 90503

Name Brenda R King
(Please print)
Name Brenda King
(Signature)
Address 6221 E Gold Dust
Scottsdale Az 85331

Name C. Y Lewis
(Please print)
Name C Y Lewis
(Signature)
Address 4808 Montebello Av
Las Vegas, Nv.

Name THOMAS H. RAY JR
(Please print)
Name Thomas H Ray
(Signature)
Address 6141 E. SAN CRISTOBAL
TUCSON ARIZ. 85715

Name Geraldine M. Hernandez
(Please print)
Name Geraldine M Hernandez
(Signature)
Address 27934 Blythdale Rd
Agoura, Ca 91301

Name L.J. HERNANDEZ
(Please print)
Name L J Hernandez
(Signature)
Address 27934 W Blythdale
Agoura, Calif 91301

Name
(Please print)
Name KENNETH BAUER
(Signature)
Address 1717 Red Mountain Dr
Boulder City, NV

Name BARBARA A. MORGAN
(Please print)
Name Barbara A. Morgan
(Signature)
Address 15815 Rayen ST
Sepulveda, Ca 91343

Name STEPHEN C. MORGAN
(Please print)
Name Stephen C. Morgan
(Signature)
Address 15815 RAYEN ST.
SEPULVEDA CA 91343

Name J Ott
(Please print)
Name 1605 Laurelwood
(Signature)
Address Colton CA 92324

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Name ADRAIN L. ALLEN JR
(Please print)
Name Adrain L Allen Jr
(Signature)
Address P.O. 6224 CANYON LAKE
CAL 92380

Name CATHERINE LONGO
(Please print)
Name Catherine Longo
(Signature)
Address 5 N. La Sierra
Arcadia Ca. 91006

Name BOB LONGO
(Please print)
Name Robt S. Longo
(Signature)
Address 5 LA Sierra Dr
Arcadia Cal 91006

Name ~~Dusty~~ DUSTY RHODES
(Please print)
Name Dusty Rhodes
(Signature)
Address 19014 DELIGHT ST
Canyon Country Cal. 91351

Name Delores Kreg
(Please print)
Name Delores Krog
(Signature)
Address Temple Bar Resort
Temple Bar. Az 86443

Name DALE WILLIAMSON
(Please print)
Name Dale Williamson
(Signature)
Address 14527 SEAFORTH AVE
NORWALK CA. 90650

Name JOY WILLIAMSON
(Please print)
Name Joy Williamson
(Signature)
Address 14527 Seaforth
Norwalk, Ca. 90650

Name P.L. COOPER.
(Please print)
Name G.L. Cooper
(Signature)
Address 6015 Starlight Dr.
Las Vegas Nevada 89130

Name G.E. Tutt
(Please print)
Name G E Tutt
(Signature)
Address 19107 Flagship Cir.
Huntington Beach, Ca.

Name A.J. Pollock
(Please print)
Name A.J. Pollock
(Signature)
Address 3637 Cherry Blossom
Fayetteville, N. Carolina

Please mail completed petitions to:
Playmate Resort Marinas
322 Lakeshore Road
Boulder City, Nevada 89005

TO BE PRESENTED TO CONGRESSMAN HARRY REID IN OCTOBER 1983

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Name Mr & Mrs. Eldo FRUEH
(Please print)
Name Mr & Mrs. Eldo Frueh
(Signature)
Address P.O. Box 85
Tonopah AZ 85354

Name MR. & MRS JOHN Bilyeu
(Please print)
Name John Bilyeu
(Signature)
Address 1016 Cheshire St
Rialto, Ca. 92376

Name MILDRED M. GRIEBEL
(Please print)
Name 3602 W VAN BUREN
(Signature)
Address Mildred M. Griebel
PHOENIX AZ 85009

Name KENNETH F GRIEBEL
(Please print)
Name Kenneth F. Griebel
(Signature)
Address 3602 W. VAN BUREN
PHOENIX AZ 85009

Name James C. Paschall
(Please print)
Name James C. Paschall
(Signature)
Address 1007 Oban Dr.
Los Angeles, Ca. 90065

Name Lynn Haskell
(Please print)
Name Lynn Haskell
(Signature)
Address 13009 Long Beat Way
Del Mar, Ca. 92014

Name WALLACE R. LA FERRIERE
(Please print)
Name Wallace R. LaFerriere
(Signature)
Address 617 N. ROSSMORE AVE
Los Angeles, CA 90004

Name CLYDE BURKE
(Please print)
Name Clyde Burke
(Signature)
Address 8216 COLUMBUS
VAN NUYS CA 91405

Name O.D. Sutton
(Please print)
Name O.D. Sutton
(Signature)
Address P.O. Box 163
Running Sps. Ca. 92382

Name DAVE HASKELL
(Please print)
Name D. Haskell
(Signature)
Address 13009 LONGBOAT WAY
Del MAR, CA 92014

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Name Keith Craygh
(Please print)
Name
(Signature)
Address 555 E 10600 So
Sandy UT 84070

Name LEE CRAYK
(Please print)
Name Lee Crayk
(Signature)
Address 2634 Willow Walk
SANDY UTAH 84092

Name [illegible] Crayk
(Please print)
Name
(Signature)
Address 9485 South 80 E
Sandy Ut 84092

Name Warner Heath
(Please print)
Name Warner Heath
(Signature)
Address 5708 Stacey Ave

Name William M. Turk
(Please print)
Name William M. Turk
(Signature)
Address Box 922 - Tehachapi
Ca.

Name Marjorie Ginsky
(Please print)
~~Name~~ Marjorie Ginsky
(Signature)
Address Star Route 10, Box 79
Las Vegas, NV 89124

Name Jack Bowman
(Please print)
Name
(Signature)
Address 5801 Trent Ave
LV Nev 89107

Name Claudia Palaios
(Please print)
Name Claudia Palacios
(Signature)
Address 417 L.V. Blvd.
Las Vegas Nev.

Name WILLIAM E. NEFF
(Please print)
Name W. E. Neff
(Signature)
Address 3950 LAS VEGAS BLVD S.
LAS VEGAS NEV.

Name WAYNE BAUER
(Please print)
Name Wayne Bauer
(Signature)
Address 3200 HICKEY AVE
N. LAS VEGAS NEV

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322 Lekeshore Road
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Name Michael L Bervier
(Please print)
Name Michael L Bernier
(Signature)
Address 2004 Sunland
Las Vegas NEV 89109

Name JOSEPH PALMIERI
(Please print)
Name Joseph Palm
(Signature)
Address 6100 E RUSSELL RD
LAS VEGAS NV

Name Chris Reed
(Please print)
Name CHRIS Reed
(Signature)
Address 154 Judy [illegible]

Name Trudy Baker Roberts
(Please print)
Name T. Baker-Roberts
(Signature)
Address Star Rt 10 Box 100
Las Vegas NV

Name Kent Nelson
(Please print)
Name Kent Nelson
(Signature)
Address 2573 No. 820 E.
Provo, Ut 84604

Name Nancy Miner
(Please print)
Name NANCY MINER
(Signature)
Address 711 Desert lane apt 12
Las Vegas, NV. 89106

Name Richard Nelson
(Please print)
Name
(Signature)
Address 7845 So. Claret St.
Salt Lake City, Utah

Name Larry Dutton
(Please print)
Name Larry Dutton
(Signature)
Address 5557 E. Lake Mead

Name DIANE K. MAGGET
(Please print)
Name Diane K. Magget
(Signature)
Address 6116 Alamo Cir
Las Vegas, NV. 89107

Name James O'BRIEN
(Please print)
Name James O'Brien
(Signature)
Address 2727 Apple Blossom
S.L.C. Utah

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Boulder City, Nevada 89005

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Name Carol SEIDENGLANZ
(Please print)
Name JAMES SEIDENGLANZ
(Signature)
Address 5500 FLOWER Circle
LAS VEGAS, NEV 89101

Name DAVID PARISH
(Please print)
Name Daniel G. Paul
(Signature)
Address 8046 Red Baron Dr.
Las Vegas, Nv. 89123

Name Linda Jean Purdy
(Please print)
Name ~~Sta~~ Linda Jean Purdy
(Signature)
Address Star Rt, 15 Box 92
Las Vegas NV 89124

Name MARGERY Lewis
(Please print)
Name Margery Lewis
(Signature)
Address 1600 E. Rochelle #77
L.V. Nev. 89109

Name Peter D Riecke
(Please print)
Name PETER D RIECKE
(Signature)
Address Las Vegas Nev

Name Guy R. Williams
(Please print)
Name Guy R. Williams
(Signature)
Address 1600 E. Rochelle #77
L.V. Nev. 89109

Name Lynne Dynes
(Please print)
Name Lynn Dynes
(Signature)
Address 2253 Coveyhn.
L.V. Nev. 89115

Name Peter Goesiner
(Please print)
Name Peter Goesiner
(Signature)
Address 1136 St. Louis St.
L.V. Nev. 89101

Name MARY JANE Johnson
(Please print)
Name Mary Jane Johnson
(Signature)
Address 7480 Los Feliz
Highland, CA. 92346

Name A.J. ROUSSEAU
(Please print)
Name A. J. Rousseau
(Signature)
Address 21320 W. Willow Weed Way
CANYON COUNTRY CAL. 91351

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Name ARTHUR BERMAN
(Please print)
Name Arth B
(Signature)
Address 7016 MICHAEL COLLINS
LAS VEGAS, NEV. 89128

Name Paul Foley
(Please print)
Name Paul Foley
(Signature)
Address 624 Brookway Ln
L.V. NV 89109

Name TORIL NeHLS
(Please print)
Name Toril Nehls
(Signature)
Address 624 Brookway Ln.
Las Vegas, Nev 89109

Name John SITONG
(Please print)
Name Sitong
(Signature)
Address 9304 E. AVE T-2
LITTLEROCK CA 93543

Name Jose Fierro
(Please print)
Name Irene Fierro
(Signature)
Address 6161 ARLINGTON
AVE

Name Shirley M. Runke
(Please print)
Name SHIRLEY M. HUNSAKER
(Signature)
Address

Name Steve Fierro
(Please print)
Name David Fierro
(Signature)
Address 6161 ARLINGTON
AVE

Name Eddie & Debbie Watt
(Please print)
Name
(Signature)
Address 6161 ARLINGTON
AVE

Name Howard RUPPRED
(Please print)
Name Howard Ruppel
(Signature)
Address 3111 Bel Air Dr.
Las Vegas 89109

Name CHARLES G. FORTSEN
(Please print)
Name Charles G Fortsen
(Signature)
Address 1953 CONTINENTAL AVE
L.V. NV. 89115

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Name CHARLES SUPIN
(Please print)
Name
(Signature)
Address LAS VEGAS, NEV

Name DANIEL J SAGER
(Please print)
Name
(Signature)
Address 201 ANTELOPE WAY
LAS VEGAS NEV 89128

Name ~~ALIANA~~ SALEN
(Please print)
Name Aliana Salen
(Signature)
Address 7208 ELLE Ct.
LAS Vegas NEV, 89128

Name BILLIE BOYD
(Please print)
Name Billie J. Boyd
(Signature)
Address SPACE 16 CALLVILLE BAY
LAS VEGAS NV

Name ED SHIELDS
(Please print)
Name
(Signature)
Address 9440 SANTA MONICA
Beverly Hills CA

Name C. JOHN SEAGLE
(Please print)
Name
(Signature)
Address 2500 E. KAREN
LAS VEGAS 89121

Name Sheri Shelton
(Please print)
Name Sheri Shelton
(Signature)
Address 6 85335
LV Nev

Name Pamela R. Woicicki
(Please print)
Name Pamela R Woicicki
(Signature)
Address 6465 Atwood Ave
Las Vegas, Nev. 89103

Name Colleen Stodghill
(Please print)
Name Colleen Stodghill
(Signature)
Address 3850 Boulder
L.V. NV.

Name Bruce E. Lehman
(Please print)
Name BRUCE E. LEHMAN
(Signature)
Address 4575 W. Twain
L. Vegas. 89121

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Name JACK [illegible] (Please print)
Name (Signature)
Address 2015 ELLIS
No LV NEV 89030

Name DONALD BASSEY (Please print)
Name Donald J Bassey (Signature)
Address 174 N. SURF LN
LAS VEGAS NV 89110

Name FRED BENNETT (Please print)
Name F Bennett (Signature)
Address CALLVILLE BAY
[illegible]

Name DEBBIE LARSON (Please print)
Name (Signature)
Address CALLVILLE BAY
LAKE MEAD NV.

Name Dan [illegible] (Please print)
Name (Signature)
Address 3970 [illegible]
Las Vegas 89109

Name Joe [illegible] (Please print)
Name (Signature)
Address [illegible]
[illegible]

Name GARY NEWB[illegible] (Please print)
Name Gary L. Newb[illegible] (Signature)
Address [illegible]
Las Vegas Nev. 89110

Name [illegible] (Please print)
Name (Signature)
Address [illegible]
[illegible] 89124

Name MARY K. DUENOW (Please print)
Name Mary K. Duenow (Signature)
Address 3500 Hills AV. No.
Las Vegas Nevada 89101

Name [illegible] (Please print)
Name (Signature)
Address [illegible]
L.V. NEV 89115

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Name STEVE LENNON
(Please print)
Name
(Signature)
Address BOX 26055
LV NV 89126

Name [illegible] T Collins
(Please print)
Name William J Collins
(Signature)
Address 6237 [illegible]
Las Vegas NEV [illegible]

Name [illegible] M. Ott
(Please print)
Name [illegible] M. Ott
(Signature)
Address Cottonwood Cove Bay
Las Vegas NV 89124

Name [illegible] Jr
(Please print)
Name
(Signature)
Address [illegible] Dr
[illegible]

Name CHRISTOPHER M. B[illegible]
(Please print)
Name [illegible] M. B[illegible]
(Signature)
Address Cottonwood Cove Bay
Las Vegas NV 89124

Name [illegible]
(Please print)
Name
(Signature)
Address [illegible] Dr
[illegible] 89106

Name [illegible] K[illegible]
(Please print)
Name [illegible]
(Signature)
Address [illegible]
[illegible]

Name [illegible]
(Please print)
Name
(Signature)
Address [illegible]
[illegible]

Name [illegible]
(Please print)
Name [illegible]
(Signature)
Address [illegible] Torch PL
[illegible], NV 89109

Name [illegible]
(Please print)
Name
(Signature)
Address

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Name HERMAN C. TILLARD
(Please print)
Name Herman C. Tillard
(Signature)
Address 870 TONI AVE
LAS VEGAS NEV 8[illegible]9

Name Keys Dean E.
(Please print)
Name Dean E. Keys
(Signature)
Address 880 Toni Ave
Las Vegas, Nev 89119

Name Shirley Selwonko
(Please print)
Name [illegible]
(Signature)
Address Star Rt [illegible] Box 90
[illegible]

Name LARRY Vosburg
(Please print)
Name Larry Vosburg
(Signature)
Address [illegible] Rose Ct.
Las Vegas Nev. 89[illegible]

Name DUANE HICKS
(Please print)
Name Duane Hicks
(Signature)
Address 1900 E. TROPICANA
#318 LAS VEGAS, 89109

Name LILLIAN V EMORY
(Please print)
Name Lillian V Emory
(Signature)
Address 6149 Kentland Ave
Woodland Hills Cal 91367

Name Jerry Witt[illegible]
(Please print)
Name Tim Bell
(Signature)
Address 2500 KAREN #165

Name ROBERT LEE
(Please print)
Name
(Signature)
Address 3086 [illegible]
[illegible]

Name LARRY & Lynne Dyer[illegible]
(Please print)
Name [illegible]
(Signature)
Address [illegible] Coxey Ln.
Las Vegas Nev 8911[illegible]

Name Julie Foutz
(Please print)
Name Julie Foutz
(Signature)
Address [illegible] Coxey Ln.
L.V. Nev. 891[illegible]

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Name [illegible] H JENSEN
(Please print)
Name
(Signature)
Address [illegible]

Name ANDRA L Ralenkotter
(Please print)
Name Andra L Ralenkotter
(Signature)
Address 5901 [illegible]
LV Nev 89107

Name [illegible]
(Please print)
Name
(Signature)
Address #[illegible] CALLVILLE BAY
Las Vegas, NV 89124

Name [illegible]
(Please print)
Name
(Signature)
Address [illegible]

Name NORMAN E. LINGO
(Please print)
Name Norman E Lingo
(Signature)
Address #33 CALLVILLE BAY
Las Vegas, NV 89124

Name [illegible] EVANS
(Please print)
Name
(Signature)
Address P.O. BOX H.C.
NEEDLES CA

Name [illegible] P. JOHNE
(Please print)
Name
(Signature)
Address [illegible] Santee Dr.
Las Vegas 89103

Name [illegible]
(Please print)
Name
(Signature)
Address [illegible] #[illegible]
Las Vegas [illegible]

Name Ric Kiefer
(Please print)
Name
(Signature)
Address 12592 Roth Pl.
White Bear lake, Minnesota

Name
(Please print)
Name
(Signature)
Address [illegible]
LV Nev 89103

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Name (Please print) Mike Jaramillo
Name (Signature) 6110 N 7th st. Phoenix, Ariz.
Address

Name (Please print) Mr + Mrs G. P. Shaw
Name (Signature)
Address Echo Bay, Nevada

Name (Please print) Bill Morrill
Name (Signature) Bill Morrill
Address 3517 Webb, N.L.V. 89030

Name (Please print) Bob Serna
Name (Signature) Robert Serna
Address 401-D N. Beth
Anaheim, CA 92806

Name (Please print) Morris Smith
Name (Signature) Morris Smith
Address Echo Bay Resort
OVERTON, Nevada

Name (Please print) David Martin
Name (Signature) David Martin
Address Echo Bay Resort
Overton, Nevada 89040

Name (Please print) Joe W Martin
Name (Signature)
Address Echo Bay Resort NEV.

Name (Please print) Tim Stokes
Name (Signature) Tim Stokes
Address 737 W 2nd ST
AZUSA CA. 91702

Name (Please print) Karyn Becker
Name (Signature) Karyn Becker
Address 1117 Nashville
Whittier, Ca. 90604

Name (Please print) GRACE CONTRERAS
Name (Signature) Grace Contreras
Address 3228 Clark Ave
El monte, Ca. 91731

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Name Brent Frakes
(Please print)
Name Brent Frakes
(Signature)
Address 4531 W. 163rd St
Lawndale, Ca 90260

Name Mary Jo ELMER
(Please print)
Name M Elmer
(Signature)
Address 4415 EMERALD
TORRANCE, CA 90503

Name TERI FUELL
(Please print)
Name Teri L. Fuell
(Signature)
Address PO BOX 1848
KIRTLAND, N.M. 87417

Name MIKE ELMER
(Please print)
Name MJ Elmer
(Signature)
Address P.O. BOX 1848
KIRTLAND, N.M. 87417

Name Kathi Richardson
(Please print)
Name Kathi Richardson
(Signature)
Address 7009 E. 39th PL
Tucson, Az 85730

Name LE CLERC J.L
(Please print)
Name
(Signature)
Address 255 / AV MONTJOIE
1180 BRUSSELS BELGIUM.

Name DEBRA CLEMENT
(Please print)
Name Debra Clement
(Signature)
Address 760 N. Holmes
Ontario, Ca

Name Donald M DAWSON
(Please print)
Name Donald M Dawson
(Signature)
Address 624 St Andrews Rd.
Henderson, Nevada 89015

Name Frank D'Aprile
(Please print)
Name Frank D'Aprile
(Signature)
Address 5762 Arbor Oak Circle
Las Vegas Nevada 89122

Name MARGY DIGGS
(Please print)
Name Margy Diggs
(Signature)
Address 15252 Seneca Rd #196
Victorville, Ca 92392

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Name Rosie Contreras
(Please print)
Name Rosie Contreras
(Signature)
Address 3728 Clark ave
El monte 91731

Name R. L. MIDGHALL
(Please print)
Name R. L. Midghall
(Signature)
Address PO BOX 93
BULLHEAD CITY, AZ 86430

Name WALTER E. WATTS
(Please print)
Name Walter E. Watts
(Signature)
Address 1800 HAREWOOD AVE.
N. LAS VEGAS 89030

Name BRENDA MURRAY
(Please print)
Name Brenda Murray
(Signature)
Address 358 Miraleste Dr. #334
San Pedro, Ca 90732

Name Robert D Mastach
(Please print)
Name Robert D Mistach
(Signature)
Address 358 Miraleste Dr #334
San Pedro Ca, 90732

Name Mr & Mrs Stokes
(Please print)
Name 6002 Brigthview
(Signature)
Address Maria Stokes
Glendora, Ca. 91704

Name Debbie Bement
(Please print)
Name Debbie Bement
(Signature)
Address 6700 E Russell Rd. Sp 15
Las Vegas NV 89122

Name ~~Robert [illegible]~~ Robert S Wise
(Please print)
Name Robert [illegible]
(Signature)
Address 2579 Bonita Dr.
Highland, ca 92346

Name TWYLA WISE
(Please print)
Name Twyla Wise
(Signature)
Address 2579 BONITA Dr
HIGHLAND CA 92346

Name Rebecca Wise
(Please print)
Name Rebecca Wise
(Signature)
Address 4531 W. 163rd St
Lawndale, Ca 90260

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Name Mike Haniuk
(Please print)
Name Mike Haniuk
(Signature)
Address 77 B Salmon DR.
L.V 89005

Name TERESA HANIUK
(Please print)
Name Teresa Haniuk
(Signature)
Address 77B Salmon
L.V. 89805

Name GINA YANdell
(Please print)
Name Gina Yandell
(Signature)
Address 2331 Daley
N.L.V.

Name JAMES DEVito
(Please print)
Name 307 W ARTESIA
(Signature)
Address James DeVito
Pomona Calif 91768

Name EMORY E ENGEL
(Please print)
Name Emory E Engel
(Signature)
Address 3982 LA BREA
LAS VEGAS NV 89110

Name Robert Lane
(Please print)
Name Robert Lane
(Signature)
Address 1305 PASS Ave
Burbank, Calif 91505

Name Alvida Lane
(Please print)
Name ALVIDA LANE
(Signature)
Address 1305 PASS AVE
BURBANK CA 91500

Name GORDON WORTHINGTON
(Please print)
Name Gordon Worthington
(Signature)
Address 4378 Kling ST.
BURBANK Ca. 91505

Name Jerry Ramsey
(Please print)
Name Jerry Ramsey
(Signature)
Address 5734 W. Alfred Dr.
Las Vegas Nev 89108

Name Richard Carson
(Please print)
Name Richard Carson
(Signature)
Address 6430 Youngmont Ave.
Las Vegas, Nevada 89103

Please mail completed petitions to: Playmate Resort Marinas
322 Lakeshore Road
Boulder City, Nevada 89005

TO BE PRESENTED TO CONGRESSMAN HARRY REID IN OCTOBER 1983

PETITION

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Name Erik Mumford
(Please print)
Name Erik Mumford
(Signature)
Address 2661 E. Creek Way
Sandy Utah 84092

Name JANE PARR
(Please print)
Name Jane Parr
(Signature)
Address 2831 E. Moon Cr.
Las Vegas, Nv. 89120

Name Kim Hutcherson
(Please print)
Name KIM HUTCHERSON
(Signature)
Address 5082 Pebble Beach #1
LAS VEGAS, NV 89108

Name Bill Grayson
(Please print)
Name Bill Grayson
(Signature)
Address 3673 Boulder Hiway
LAS Vegas NV 89121

Name Leonard Robinson
(Please print)
Name Leonard Robinson
(Signature)
Address P.O. Box 43901
Las Vegas, NV 89116

Name Darren Sullivan
(Please print)
Name Darren Sullivan
(Signature)
Address 732 8th St
Boulder City, NV 89005

Name Michael N. Stansfield
(Please print)
Name
(Signature)
Address 846 S. Cedarwood Ln.
Cedar City, Ut

Name A. BRAD STAPLEY
(Please print)
Name A. BRAD STAPLEY
(Signature)
Address 1008 S. Cedar Knolls
Cedar City Ut. 84720

Name Tonia Smith
(Please print)
Name Tonia Smith
(Signature)
Address Echo Bay Resort
Overton, Nevada 89040

Name Mike Haniuk
(Please print)
Name Mike Haniuk
(Signature)
Address 2701 Berg Nevada
89050

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Name DENNIS COOMBS
(Please print)
Name Dennis Coombs
(Signature)
Address 2244 BUENA VISTA
Las VEGAS NEV 89102

Name Frank D'Aprile
(Please print)
Name FRANK D'Aprile
(Signature)
Address 5762 ARBOR OAK CR
L.V. 89122. NEV.

Name PAT & DICK BALES
(Please print)
Name Patrice E. Bales
(Signature)
Address 5482 LONDONDERRY
LAS VEGAS, NV. 89109

Name BILL + LOUISE KOURIM
(Please print)
Name Bill Kourim
(Signature)
Address 1421 N. MOJAVE Rd.
LAS VEGAS NEV. 89101

Name K.M. JAMMA
(Please print)
Name 4902 NETTIE
(Signature)
Address LAS VEGAS 89110
K.M. Jamma

Name Ed + Denise KAMMER
(Please print)
Name Ed + Denise Kammer
(Signature)
Address 3937 IRONGATE
L.V. 89120

Name PAULINE MUMFORD
(Please print)
Name Pauline M Mumford
(Signature)
Address 2161 Creek Way
Sandy, Ut 84092

Name Ed JACKSON
(Please print)
Name Anna Jackson
(Signature)
Address P.O. BOX 29
Indian Springs NV. 89018

LOCILLE E JOHNSON
Name Lucille E. Johnson
(Please print)
Name Harold L Johnson
(Signature)
Address 116 Chason
Las Vegas Nev 89107

Name MARIE MARTIN
(Please print)
Name Marie Martin
(Signature)
Address 3015 Escoba Dr
Palm Springs CA.

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Name Lilly Burns
(Please print)
Name Lilly Burns
(Signature)
Address Echo Bay Resort
Overton, Nv. 89040

Name Karen Remais
(Please print)
Name Karen Remais
(Signature)
Address 6545 Edgemar Ave
Anaheim, Ca.

Name VERN VANDAL
(Please print)
Name Vern K. Vandal
(Signature)
Address 14092 WINDSOR Pl.
SANTA ANA, CA. 92705

Name DL FENNER
(Please print)
Name
(Signature)
Address 2018 Santa Cruz

Name Bryan M Mumford
(Please print)
Name Bryan M Mumford
(Signature)
Address 2161 Creek Way
Sandy, Ut 84092

Name LINDA LINK
(Please print)
Name Linda Link
(Signature)
Address 121 Terra Cotta
Lake Elsinore CA

Name R. D. HARÉ
(Please print)
Name R. D. Hare
(Signature)
Address 15427 Flatbush
Norwalk Ca.

Name LOUISE HARE
(Please print)
Name Louise Hare
(Signature)
Address 15427 Flatbush
Norwalk Ca 90650

Name EDWARD C. STRUTT
(Please print)
Name Edward C. Strutt
(Signature)
Address 931 Hospital Road
Lake Arrowhead, Ca 92352

Name BRIAN AMBROZICH
(Please print)
Name Brian Ambroz
(Signature)
Address 10106 SAGE HILL WAY
Escondido, Cal. 92026

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Name STACEY R. BARTLEY
(Please print)
Name
(Signature)
Address [illegible]
[illegible]

Name Craig Jones
(Please print)
Name 4
(Signature)
Address 4391 Pine Grove St
Las Vegas NV 89117

Name DAVID W. SMETH
(Please print)
Name David W Smith
(Signature)
Address 649 Ave. H
Boulder City, Nv.

Name [illegible]
(Please print)
Name LINDA GRETTON
(Signature)
Address 727 JENARI Ct,

Name John R Zimbeck, NS
(Please print)
Name John R Zimbeck
(Signature)
Address 1919 Florence Ave
Kingman AZ 864[illegible]

Name VALerie MOON
(Please print)
Name Valerie Moon
(Signature)
Address 1850 TEAK Ct.
HEND, Nev. 89015

Name HARRY RAHNER
(Please print)
Name 3962 E. [illegible] ave L.V. 89121
(Signature) Gwen Rahner
Address

Name Ron Nesheim
(Please print)
Name Ron Nesheim
(Signature)
Address

Name CRAIG F ASHCRAFT
(Please print)
Name Craig F Ashcraft
(Signature)
Address P.O. 714
NELLIS AFB. NV. 89191

Name JON S. BEYER
(Please print)
Name Jon S Beyer
(Signature)
Address Box 1407 Nellis AFB
NEV. 89191

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Name FAY A. BRUMMETT
(Please print)
Name F. A. Brummett
(Signature)
Address L.V. Nevada

Name SUZANNE R. WRONO
(Please print)
Name Su. R. Wr
(Signature)
Address Las Vegas
580 W. Dale Ave Nev.

Name Mike Adams
(Please print)
Name [redacted]
(Signature)
Address

Name JIM LEMENICK
(Please print)
Name Jim Lemenick
(Signature)
Address 46 Lowery
Henderson NV. 89015

Name LEOLA KUKLA
(Please print)
Name Leola Kukla
(Signature)
Address 328 Lake Shore Rd.
Boulder City Nev. 89005

✓ Name LOUINA REBHAN
(Please print)
Name Louina Rebman
(Signature)
Address 1295 SHENANDOAH
BOULDER CITY, NEV.

Name BRUCE McCALL
(Please print)
Name Bruce McCall
(Signature)
Address 2950 So. DECATUR D-1
LAS VEGAS, NV. 89102

Name Michael E Hamblin
(Please print)
Name
(Signature)
Address 5532 [illegible] Rd
Las Vegas, NV 8912[illegible]

✓ Name LOIS J. HOOVER
(Please print)
Name Lois J. Hoover
(Signature)
Address 322 Lakeshore Rd.
Boulder City, NV. 89005

✓ Name Marc A. Russell
(Please print)
Name MARC A. RUSSELL
(Signature)
Address 3844 Vista Largo Dr.
L.V. NV. 89121

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Name CATHERINE PALMER
(Please print)
Name Catherine Palmer
(Signature)
Address 6700 E Russell Rd.
Las Vegas Nev. 89122

Name J Quigley
(Please print)
Name JeFF Quigley
(Signature)
Address StAR Rt 10 BX 61
LAS VEGAS, NEV. 89124

Name WILLIAM JOSEPH McKAY
(Please print)
Name William J McKay
(Signature)
Address STAR ROUTE 10 BOX 14
LAS VEGAS, NV 89124

Name TRACY OTT
(Please print)
Name Tracy Ott
(Signature)
Address STAR ROUTE [illegible] BOX [illegible]
LAS VEGAS NV [illegible]

Name CHRIS BIRD
(Please print)
Name Chris Bird
(Signature)
Address ST ROUTE 10 BOX 100
LAS VEGAS, NV 89124

Name RICHARD SIMMONS
(Please print)
Name [illegible] Simmons
(Signature)
Address STAR RT 10 BOX 100
LAS VEGAS NV 89124

Name TOM Smith
(Please print)
Name Tom Smith
(Signature)
Address 5366 Ranchero St.
L.V., Nev. 89119

Name DEMPSEY HEFFLEY
(Please print)
Name Dempsey Heffley
(Signature)
Address Star Route 10 Box 58
Las Vegas NV 89124

Name MILDRED PUSHNIG
(Please print)
Name Mildred Pushnig
(Signature)
Address 3356 Beam Dr.
Las Vegas, Nv. 89118

Name WILLIAM TRUEFITT
(Please print)
Name William J Truefitt
(Signature)
Address 3356 Beam. Dr.
Las Vegas. NV 89118

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Name Jim Lyon
(Please print)
Name JIM LYON
(Signature)
Address 609 - Sleepy Hollow
Laguna Beach, CA. 92651

Name Marcia E Rogers
(Please print)
Name Marcia E. Rogers
(Signature)
Address P.O. Box 1405
Morgan Hill, Calif. 95037

Name C. RANDAL GUTZMAN
(Please print)
Name C. Randal Gutzman
(Signature)
Address 4371 PINEGROVE St.
LAS Vegas, NEV. 89117

Name Betty Hansen
(Please print)
Name Betty M. Hansen
(Signature)
Address 4079 Syracuse
Las Vegas Nevada 89121

Name Gladys Wood
(Please print)
Name Gladys Wood
(Signature)
Address 373 Bay St
Costa Mesa Calif 92627

Name M.C. Wood
(Please print)
Name M.C. Wood
(Signature)
Address 373 Bay St
Costa Mesa Calif 92627

Name SUE WILLIAMS
(Please print)
Name Sue Williams
(Signature)
Address 802 FIREWEED DR.
HENDERSON NV.

Name George Mamasis
(Please print)
Name GEORGE MAMASIS
(Signature)
Address 53 W. PACIFIC #2
Henderson, Nv.

Name BILL DALEY
(Please print)
Name Bill Daley
(Signature)
Address 2739 GreenCrest
L. V. NEV. 89121

Name W. SAYANDA
(Please print)
Name
(Signature)
Address 4729 MONACO RD.
L.V., NEV. 89121

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Name R.O. HENSHAW JR
(Please print)
Name Rupert O. Henshaw
(Signature)
Address 8646 E. HUBBELL ST
SCOTTSDALE AZ 85251

Name DOROTHY M. CARTLIDGE
(Please print)
Name Dorothy M. Cartlidge
(Signature)
Address BX 245
DOLAN SPRINGS ARIZ 86441

✓
Name CHARLES L. PUGH JR.
(Please print)
Name Charles L. Pugh Jr.
(Signature)
Address 668 California St.
Boulder City, Nv. 89005

✓
Name Claudine Carpenter
(Please print)
Name Claudine Carpenter
(Signature)
Address 668 Calif. St.
B.C. NV.

Name JOHN H McAULIFFE
(Please print)
✓
Name LAS VAGAS BOAT-HARBR
(Signature)
Address LAS VAGES BOAT HABOR
HENDERSON BOX 771

✓
Name DICK FARMER
(Please print)
Name Dick Farmer
(Signature)
Address 1544 GEORGIA AVE
B.C. NEV, 89005

Name Micheal E. DARR
(Please print)
Name Micheal E. Darr
(Signature)
Address P.O Box 27
Pittman, Nev. 89044

Name GERALD C. LEDBETTER
(Please print)
Name 2720-C CALLE CABALLERO
(Signature)
Address SAN JUAN CAPISTRANO, CA 92675

Name ED DE LONG
(Please print)
Name Edward DeLong
(Signature)
Address BX 488
DOLAN SPRINGS ARIZ 86441

✓
Name SHIRLEY Thompson
(Please print)
Name Shirley Thompson
(Signature)
Address 2658 Heritage Ct N
Las Vegas, Nevada 89121

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Name ERIC ZUBEL
(Please print)
Name
(Signature)
Address 5829 THOR DR
LAS VEGAS, NV. 89108

Name KENNY BAKER
(Please print)
Name Kenneth J. Baker
(Signature)
Address 1625-B ALTA DR.
LAS VEGAS 89106

Name MARY BROWN
(Please print)
Name Mary Brown
(Signature)
Address 6119 Pawnee
Henderson, Nev 89015

Name Dorothy Cagle
(Please print)
Name Dorothy Cagle
(Signature)
Address 1946 [illegible]
Henderson Nev 89015

Name MICHAEL SAMSON
(Please print)
Name Michael Samson
(Signature)
Address 4320 ESCONDIDO #25
L.V. NEV. 89109

Name Frank Baggs
(Please print)
Name Frank Baggs
(Signature)
Address 2730 San Darnga LV
Nev 89115

Name Robert Fernandes
(Please print)
Name
(Signature)
Address 2716 Bello Dr
NLV NEV.

Name ROBERT S. LUKOWSKI
(Please print)
Name Robert S. Lukowski
(Signature)
Address 1320 ESTHER AVE
Boulder City, NV 89005

Name WALLEEN A. LUKOWSKI
(Please print)
Name Walleen A. Lukowski
(Signature)
Address 1320 ESTHER DR.
BOULDER CITY, NV. 89005

Name Jack Martin
(Please print) Jack Martin
Name LAS Vegas
(Signature)
Address 3611 FLORRIE AVE
89121

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Name (Please print) Toni SPRATT
Name (Signature) Toni Spratt
Address 3531 (Maricopa) Way
Las Vegas, Nev. 89109

Name (Please print) DAWN BERKENSTOCK
Name (Signature) Dawn Berkenstock.
Address P.O BOX 19124
L.V. Nev 89119

Name (Please print) ROLLAND J. BROWN
Name (Signature)
Address 5221 FOREST HILL'S
LAS VEGAS, NV. 89108

Name (Please print) D. MAXINE BROWN
Name (Signature) D. Maxine Brown
Address 5221 FOREST HILL'S LN.
LAS VEGAS, NV. 89108

Name (Please print) JAMES R. Hompray
Name (Signature)
Address 1100 - N. Center ST. #313
Henderson, NV. 89015

Name (Please print) MICHAEL S. PETERSON
Name (Signature) Michael S. Peterson
Address 1100 N. CENTER ST. #313
HENDERSON, NEVADA, 89015

Name (Please print) MICHAEL PISANELLO
Name (Signature)
Address 4414 EL CAMPANA
L.V. NEV. 89121

Name (Please print) Mid Alba
Name (Signature) Mid Alba
Address 5449 Sierra Vista #6
Las Vegas, NEV 89109

Name (Please print) F.E. TYNER
Name (Signature)
Address 2500 KAREN
L.V., NV. 89121

Name (Please print) VINCE CONOSCENTI
Name (Signature) Vince Conoscenti
Address 275 PECOS WAY
LAS VEGAS, NV 89121

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Name DENNIS V. MEYER
(Please print)
✓ Name Dennis V. Meyer
(Signature)
Address 3061 GREENDALE St.
LAS VEGAS, NEVADA 89121

Name WM CLARK
(Please print)
✓ Name Wm Clark
(Signature)
Address 5050 Tamarus #4
L.V., Nev. 89119

Name Samuel S. Egdorf
(Please print)
✓ Name Samuel S. Egdorf
(Signature)
Address 3511 [illegible] Cir
Las Vegas NV 89122

Name Karen Howell
(Please print)
✓ Name 1638 [illegible] Tr
(Signature)
Address Karen Howell
Las Vegas, Nev 89108

Name [illegible]
(Please print)
✓ Name [illegible]
(Signature)
Address [illegible]
[illegible]
89122

Name PEG McKNIGHT
(Please print)
✓ Name Peg McKnight
(Signature)
Address 1691 Palomino Dr
HENDERSON, NV 89015

Name ROBERT K. McKNIGHT, JR.
(Please print)
✓ Name Robert K. McKnight Jr.
(Signature)
Address 1691 Palomino Dr.
Henderson NV 89015

Name STEVIE IVES
(Please print)
Name
(Signature)
Address 9742 VIA MEDIA
CYPRESS, CA. 90630

Name Michele Bidaud.
(Please print)
Name M Bidaud
(Signature)
Address 16411 Gothic Pc
GRANADA Hills CA

Name Robert Pope
(Please print)
Name R Pope
(Signature)
Address 16411 Gothic PL
GRANADA Hills CA.

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Name GREG D. PHILLIPS
(Please print)
Name Greg D. Phillips
(Signature)
Address 46 CHURCH ST
HENDERSON NEV, 89015

Name Rita Y. GAGER
(Please print)
Name Rita Y. Gager
(Signature)
Address P.O. Box 27013
Las Vegas Nv. 89126

Name Monte J. Meyerdirk
(Please print)
Name P.O.B. Monte Meyerdirk
(Signature)
Address P.O.B. 1685
Boulder Co 80306

Name Robert Ciani
(Please print)
Name Robert E. Ciare
(Signature)
Address 805 29TH. St. #103
Boulder, Co.

Name L.W. Leonard
(Please print)
Name L.W. LEONARD
(Signature)
Address 3530 Ormin #273
La Verne Ca.

Name DEE KINKEADE
(Please print)
Name Dee Kinkeade
(Signature)
Address 5409 Eastbrook
Las Vegas, NV 89122

Name Mickey Willenberg
(Please print)
Name Mickey Willenberg
(Signature)
Address POB 15091
LV. 89114

Name Jim KuykendAll
(Please print)
Name Jim Kuykendall
(Signature)
Address 4850 e Charleston #5
L.V. Nevada

Name Lora Kuykendall
(Please print)
Name LORA KUYKENDALL
(Signature)
Address 4850 E CHARLESTON BLV. #5
L.V. NEVADA

Name Annette Eckert
(Please print)
Name PO Box 7125
(Signature)
Address [illegible] Co 80306
Annette G. Eckert

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Name D.J. KIRWAN
(Please print)
Name
(Signature)
Address 426 DAFFODIL
HENDERSON NV 89015

Name K KIRWAN
(Please print)
Name K Kirwan
(Signature)
Address 426 DAFFODIL
Henderson, NV 89015

Name JOHN D MANSON
(Please print)
Name John D Manson
(Signature)
Address 1307 Darlene WAY A-5
BOULDER CITY NV 89005

Name FRED BROWER
(Please print)
Name Fred Brower
(Signature)
Address 750 East Flamingo Rd
Las Vegas Nev. 89109

Name [illegible]
(Please print)
Name [illegible]
(Signature)
Address [illegible]

Name [illegible]
(Please print)
Name [illegible]
(Signature)
Address [illegible] A O'Donnell
N.V. [illegible]

Name MICHEL [illegible]
(Please print)
Name [illegible]
(Signature)
Address [illegible]

Name Michael MonTgomery
(Please print)
Name
(Signature)
Address 1303 [illegible]
Boulder City 89005

Name Patricia M. Montgomery
(Please print)
Name Patricia M. Montgomery
(Signature)
Address 1505 Darlene Way
Boulder City Nv 89005

Name FRED DAVIES
(Please print)
Name Fred Davies
(Signature)
Address 3249 LIAHONA WAY
LAS VEGAS NV 89121

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Name H.A.HOLTON
(Please print)
Name H. A. Holton
(Signature)
Address 10511 E. AVE. "O" Palmdale Cal.

Name ED K. MIDDLESWART
(Please print)
Name Ed K. Middleswart
(Signature)
Address 2736 HILLEGASS
BERKELEY, CALIF
94705

✓ Name ERIC M MOORE
(Please print)
Name Eric M. Moore
(Signature)
Address 1017 SIR PATRICK Ave
LAS Vegas Nv 89119

Name Marion A. Hunt
(Please print)
✓ Name Marion A. Hunt
(Signature)
Address P.O. Box E.O.
Henderson, Nev 89015

Name Bob Routin
(Please print)
Name Bob Routin
(Signature)
Address 108 Palisade

Name Kenneth Johnson
(Please print)
Name
(Signature)
Address 93 East Reno
Las Vegas NV

Name VALERIE M. KOS
(Please print)
✓ Name Valerie M Kos
(Signature)
Address 108 Palisade Ave.
Las Vegas, NV 89110

Name Mark James Hatten
(Please print)
✓ Name Mark James Hatten
(Signature)
Address 4255 Channel 10 Dr #18
Las Vegas NV 89109

Name Glen Rudolph
(Please print)
✓ Name Glen Rudolph
(Signature)
Address 5316 E [illegible]
Las Vegas NV [illegible]

✓ Name KEITH HOLLAND
(Please print)
Name Keith Holland
(Signature)
Address P.O. BOX 403
HENDERSON NV 89015

Please mail completed petitions to: Playmate Resort Marinas
322 Lakeshore Road
Boulder City, Nevada 89005

TO BE PRESENTED TO CONGRESSMAN HARRY REID IN OCTOBER 1983

PETITION

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Name R.E. MYERS
(Please print)
✓ Name R.E. Myers
(Signature)
Address 210 W. ATLANTIC
HENDERSON, NV.

Name ARDEN LEE STEWART
(Please print)
✓ Name Arden Lee Stewart
(Signature)
Address 2849 W Craig Rd
N. Las Vegas, Nev 89030

Name DONALD G STEWART
(Please print)
✓ Name Donald Stewart
(Signature)
Address 2849 W. Craig Rd
N. Las Vegas, Nev 89030

Name ERIC J. MOORE
(Please print)
✓ Name Eric J. Moore
(Signature)
Address 1017 SIR PATRICK AVE
LAS VEGAS, NV. 89119

Name THELMA K. HOLTON
(Please print) Thelma K. Holton
Name 10511 E. AVE. O
(Signature)
Address PALMDALE, CALIF. 93550

Name RONALD E. GEBERT
(Please print)
✓ Name Ronald Gebert
(Signature)
Address P.O. BOX 42862
LAS VEGAS, NEV. 89116-2

Name JOHN DICKINSON
(Please print)
✓ Name John Dickinson
(Signature)
Address 873 DENET
Las Vegas 89112

Name JOHN H MCAULIFFE
(Please print)
Name John Henry Mc Auliffe
(Signature)
Address LAS VEGAS BOAT HARBOR
HENDERSON, NV

Name Charles Harding
(Please print)
✓ Name Charles Harding
(Signature)
Address 770 Brentwood
Reno NV. 89502

✓ Name DOROTHY HARDING.
(Please print)
Name Dorothy D. Harding.
(Signature)
Address 770 Brentwood Dr.
Reno N.V. 89502.

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Name GEO. FREDERICKS
(Please print)
✓ Name Geo Fredericks
(Signature)
Address 1384 SANTA ANITA
Las Vegas. Nev. 89104

Name Tom WRENN
(Please print)
✓ Name ~~6136 CASH Lomita~~ Tom Wrenn
(Signature)
Address 6136 CASH Lomita
LV. NEV 89110

Name E. A. SCHUMACHER
(Please print)
✓ Name E.A. Schumacher
(Signature)
Address 1349 PYRAMID DR.
LAS VEGAS, NEV. 89108

Name Leon W. Critz
(Please print)
✓ Name Leon W Critz
(Signature)
Address PO Box 1099 Henderson
Nevada 89015

Name Gordon Muller
(Please print)
Name Gordon Muller
(Signature)
Address PO BOX 349
Pittman NV 89044

Name DONALD D. HANDY
(Please print)
✓ Name Donald D. Handy
(Signature)
Address 2004 W. MESQUITE
LAS VEGAS NEV. 89106

Name Fred Hancock
(Please print)
Name Fred Hancock
(Signature)
Address Box 1099 Henderson NV

Name ~~[illegible]~~
(Please print)
Name
(Signature)
Address

Name MR + MRS V. Bustos
(Please print)
✓ Name Mrs. V. Bustos
(Signature)
Address 2800 S LAMB # 117
LV, NV 89121

Name Harold Weatherly
(Please print)
✓ Name Harold E. Weatherly
(Signature)
Address 4320 Nolan Way.
Las Vegas, Nev. 89107

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Name MARTHA C. WARNE
(Please print)
Name Martha C. Warne
(Signature)
Address 1821 Golden Shadow Dr.
Henderson, Nv. 89015

Name NILES S. WARNE
(Please print)
Name Niles S Warne
(Signature)
Address Same as above

Name Paul TRagale
(Please print)
Name
(Signature)
Address 5400 MaRyland Pky
LaS VegaS Nevada 89119

Name C TRagale
(Please print)
Name
(Signature)
Address 5400 MaRyland Pky
L-V Nevada 89119

Name Sal TRagale
(Please print)
Name
(Signature)
Address 5400 MaRyland Pky
LV Nevada 89119

Name FRANK C Giordano
(Please print)
Name
(Signature)
Address 1902 RAWhide
LAS VEGAS, NV 89119

Name JOHN REILLY
(Please print)
Name John Reilly
(Signature)
Address 5280 ITHACA AVE
LV, NV 89122

Name KATHY CHAPMAN
(Please print)
Name Kathy Chapman
(Signature)
Address 3821 Remsurt Dr
Las Vegas Nev 89121

Name Michael Garramone
(Please print)
Name Michael Garramone
(Signature)
Address 3752 Forestcrest Dr
Las VegaS Nv. 89121

Name DANIEL LAFFERTY
(Please print)
Name
(Signature)
Address 432 AVE B
Boulder City NV
89005

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✓ Name (Please print) JOANNE YATES
Name (Signature) Joanne Yates
Address 4120 Montoya Ave
LV. N 89120

Name (Please print) PAUL C PETERS
Name (Signature) Paul C Peters
Address 7048 E. ALDEN LV NEV

✓ Name (Please print) David A. Camp
Name (Signature) DAVID A. CAMP
Address 428 LONGTREE AV.
HENDERSON, NEV.

✓ Name (Please print) FRANK BALANIS
Name (Signature) Frank Balanis
Address 650 Glenwood Ln.
Hend.

✓ Name (Please print) PETER R PEREZ
Name (Signature) Peter R. Perez
Address 3401 El Conlon #64
LV, NEV. 8910

Name (Please print) John C. STEWART JR.
Name (Signature) John C. Stewart Jr.
Address 3000 E. Lakemead

✓ Name (Please print) John Oberg
Name (Signature) John Oberg
Address 3719 Hazelwood #11
LV. 89109

Name (Please print) LEN Ching
✓ Name (Signature)
Address 2228 Rawhide
Las Vegas, NV 89119

Name (Please print) Bill Barth
✓ Name (Signature) William H. Barth
Address 1223 cheyenne ct.
B.C. NV

✓ Name (Please print) James L. [illegible]
Name (Signature)
Address 2309 [illegible] DR.
HENDERSON, NEV. 89015

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Name Mike Golubic
(Please print)
✓ Name Mike E. Golubic
(Signature)
Address 4794 Via San Andros
LAS Vegas NV 89103

Name Robert Frime
(Please print)
Name Roger Pfister
(Signature)
Address 1055 E Flamingo Rd
LV Nev.

Name Ron P. Ellis
(Please print)
✓ Name ROBERT P. ELLIS
(Signature)
Address 857 CENTER ST
HENDERSON, NEV

Name SAM KRUG
(Please print)
Name Sam Krug
(Signature)
Address 2021 So 11th
Las Vegas, Nev

✓ Name Daniel C. Belcore
(Please print)
Name
(Signature)
Address 6550 Casa Linda Dr
Las Vegas NV 89103

Name LARRY RICHARDS
(Please print)
✓ Name Sandy L. Richards
(Signature)
Address 6550 Casa Linda Dr
LAS VEGAS NV. 89103

Name GARY COWART
(Please print)
Name
(Signature)
Address 1491 S. 8th St
LAS Vegas NV

Name DEBI FARR
(Please print)
✓ Name Debi Farr
(Signature)
Address 3580 DEATH VALLEY DR.
LAS VEGAS, NEV. 89122

Name [illegible] HIRSCHMAN
(Please print)
Name
(Signature)
Address 2500 PALOMINO
LAS VEGAS, NEV,

✓ Name Mr & Mrs. L. D. GOSHORN
(Please print)
Name Mrs. L. D. Goshorn
(Signature)
Address 3118 Valleywood Rd.
~~[illegible]~~ Henderson, Nv. 89015

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Name NANCY E. BRADLEY
(Please print)
✓ Name Nancy E Bradley
(Signature)
Address 21816 Kashda 'L' Avenue
Carson, Ca 90745

Name WILLIAM J. SMILEY
(Please print)
✓ Name William J Smiley
(Signature)
Address 4380 BUNNY DUNES DR
LAS VEGAS NV- 89124

Name Evelyn FARR
(Please print)
Name Evelyn Farr
(Signature)
Address 3580 Death Valley Dr.

Name DIAN FARR
(Please print)
✓ Name Dian Farr
(Signature)
Address 3580 Death Valley
Las Vegas, NV 89122

Name GREG L. RAGSTER
(Please print)
✓ Name Greg Ragster
(Signature)
Address 4545 PENNWOOD AVE.
LV 89102

Name JOHN R. PAEZ
(Please print)
✓ Name John R. Paez
(Signature)
Address 233 H. LUCKEST
HENDERSON, NEV 89105

Name J.E. RUSSELL
(Please print)
Name J E Russell
(Signature)
Address 1299 N. SUNFLOWER
COVINA, CA 91724

Name MIKE PRUNCHAK
✓ (Please print)
Name Michael J. Prunchak
(Signature)
Address 3898 OAKHILL ST
L.V. Nev. 89121

Name RON Walls
(Please print)
Name Ron Walls
(Signature)
Address 2830 E Amore
L.V. NV

Name LARRY C Gathof
(Please print)
✓ Name Larry C Gathof
(Signature)
Address 3044 SCARLET OAK
LAS VEGAS NV 89104

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Name DEE R. EGBERT
(Please print)
✓ Name Dee R. Egbert
(Signature)
Address 3383 ROYCE CT,
LAS VEGAS, NV. 89121

Name JOAN EGBERT
✓ (Please print)
Name Joan Egbert
(Signature)
Address 3383 Royce Ct.
L.V. Nv. 89121

Name ANN M. JERDAN
✓ (Please print)
Name Ann M. Jordan
(Signature)
Address 1186 Maryland Cr. #1
L.V. NV. 89109

Name Helen Smiley
✓ (Please print)
Name H. E. Smiley
(Signature)
Address 4380 Sunny Dunes
L.V. NV 89121

Name MIKE MARINO
✓ (Please print)
Name Mike Marino
(Signature)
Address 4886 Imperial
L.V. NEVADA 89104

Name THOMAS STONE
(Please print)
Name ROBERT BERGERON
(Signature)
Address

Name Robert Velasquez
(Please print)
Name Robert J. Velasquez
(Signature)
Address B-26 EASY ST.
HENDERSON, NEV.

Name John C. Stewart SR
(Please print) 3600 East Lake [illegible]
Name Samuel P. Kirsch
(Signature) S. Kirsch
Address 3752 Forestcrest
L.V. NV 89121

Name Keny Redelsperger
✓ (Please print)
Name Kenny Redelsperger
(Signature)
Address 2299 Carlsbad cir
LV Nev. 89101

Name Wm Spellman
✓ (Please print)
Name
(Signature)
Address 161 E. Rancho
Henderson, Nev. 89015

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Boulder City, Nevada 89005

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Name Tommy Garcia
(Please print)
✓ Name TOMMY GARCIA
(Signature)
Address 119 YUCCA
HEND. NEV.

Name MARIA J. CRESPIN
(Please print)
Name Maria J. Crespin
(Signature)
Address 602 SERRA Vista Dr.

~~Name Richard B. Campbell~~
~~(Please print)~~
~~Name 1517 PRICE~~
~~(Signature)~~
~~Address~~

Name Richard Bruce Campbell
(Please print)
✓ Name RICHARD BRUCE CAMPBELL
(Signature)
Address 1517 PRICE ST
HEND. NEV 89105

✓ Name Rebecca Campbell
(Please print)
Name REBECCA CAMPBELL
(Signature)
Address 1517 PRICE
HDN, NV 89015

Name Donald G. Lee
(Please print)
✓ Name Donald G Lee
(Signature)
Address 5085 Via de Palma
Las Vegas, NV 89102

Name Sidney Martin
(Please print)
✓ Name Sidney Martin
(Signature)
Address 7 ARIZONA Way
HENDERSON, NEV 89015

Name BENNY BOTTITA
(Please print)
✓ Name Benny Bottita
(Signature)
Address 2422 LACASA
HENDERSON NV. 89015

Name Chris J. Rolland
(Please print)
Name Chris J. Rolland
✓ (Signature)
Address 4840 E. ELAINA AVE.
LAS VEGAS NEV. 89120

Name Dianne K. Rolland
(Please print)
Name Dianne Rolland
(Signature)
Address 4840 E Elaina ave
Las Vegas Nevada 89120

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Name JAMES C. BENNETT
(Please print)
✓ Name James C. Bennett
(Signature)
Address 3012 FERNDALE AV
LAS VEGAS, NV. 89121

✓ Name Betty McGinty
(Please print)
Name Betty McGinty
(Signature)
Address 5149 E. Sun Valley
Las Vegas, NV 89122

Name JACK McGINTY
(Please print)
✓ Name Jack McGinty
(Signature)
Address 5149 E. SUNVALLEY Dr.
L.V. 89122

✓ Name Robert L. Mikle
(Please print)
Name Robert L. Mykle
(Signature)
Address 2316 SANTA PAULA DR.
LAS Vegas Nev. 89104

Name Walter S Glenn
(Please print)
✓ Name Walter S Glenn
(Signature)
Address 3851 So Decatur #147
Las Vegas Nev 89102

Name B.J. NASH
(Please print)
✓ Name
(Signature)
Address 700 E. Flamingo
Las Vegas NV 89109

Name CRAIG COOK
(Please print)
✓ Name Craig Cook
(Signature)
Address 2213 HEAVENLY VIEW DR
Henderson NV 89015

Name ROBERT E BALENKOTTER
(Please print)
✓ Name
(Signature)
Address 5901 IRIS AVE
LAS VEGAS, NEV. 89107

Name CAthy L. Huntzinger
(Please print)
✓ Name Cathy L. Huntzinger
(Signature)
Address 5221 Andover Dr.
Las Vegas Nev. 89122

Name DAVID E EFNER
(Please print)
✓ Name David E. Efner
(Signature)
Address 5221 Andover Dr.
Las Vegas Nev. 89122

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Name (Please print) MICHAEL D. MILLER
✓ Name (Signature)
Address 5412 CONVILLE PL
L.V. NEV 89120

Name (Please print) M.H. CALHOUN
✓ Name (Signature) M K Calhoun
Address 3229 E. LARK CIR.
L.V. NEV 89121

Name (Please print) Art Bruce
✓ Name (Signature) ~~#4~~ ART BRUCE
Address 4793 Harmon Ave
Las Vegas, Nev. 89121

Name (Please print) LEE BAILEY
✓ Name (Signature) Lee Bailey
Address 4309 SAWYER AVE
LAS VEGAS, NEV 89108

Name (Please print) BARRY HEINRICHS
✓ Name (Signature)
Address 2716 So. SORREL
LAS VEGAS, NEV 89108

Name (Please print) Don Peet
✓ Name (Signature) Donald Peet
Address 5485 Clydesdale
L.V. Nev. 89119

Name (Please print) Judy ROBBINS
✓ Name (Signature) Judy Robbins
Address 5172 Tennis Court
LAS VEGAS NV 89120

Name (Please print) STEVE BARTON
✓ Name (Signature)
Address 4202 FLAMINGO CREST #5
LAS VEGAS, NV. 89121

Name (Please print) JAMES R. WILSON
Name (Signature) James R. Wilson
Address 3904 MERRITT
LAS VEGAS NEVADA

Name (Please print) Tim Lewis
✓ Name (Signature)
Address 6960 Paddington way
L.V. NV. 89122

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Name (Please print) ROBERT RICHARDS
Name (Signature) Robert Richards
Address 3710 E. HACIENDA
LAS VEGAS, NEV 89120

Name (Please print) G.A Jensen
Name (Signature)
Address 6301 SHAWNEE
LV. Nev 89107.

Name (Please print) SUSAN NESBIT
Name (Signature) Susan Nesbit
Address 1322 Pinto Rd
Boulder City, Nv 89005

Name (Please print) Rick SEATON
Name (Signature) Rick Seaton
Address 642 Arroyo Wy
Boulder City NV 89005

Name (Please print) STEVE TOTH
Name (Signature) Steph S. Toth.
Address 512 TARA CT.
BOULDER CITY, 89005

Name (Please print) RICHARD JONES
Name (Signature) Richard Jones
Address 390 RADWICK DR
LAS VEGAS NEV 89110

Name (Please print) WALLY JURCZYK
Name (Signature) Wally Jurczyk
Address 3560 JEWEL CAVE
DR 89122

Name (Please print) DONALD WEBB
Name (Signature) ELAINE WEBB
Address 2924 E CORNNBIRD
LV. NEV 89120

Name (Please print) RON MARSHALL
Name (Signature) Ronald B. Marshall
Address 2627 S. LAMB BLVD
LV - NEV 89121

Name (Please print) DENNIS THOMAS
Name (Signature)
Address 3976 GREENLEAF
LV. NV 89121

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Name John L. Barnett
(Please print)
Name John L. Barnett
(Signature)
Address 4958 E. Van Buren
Las Vegas Nev

Name STEPHEN E. CUTSHALL
(Please print)
Name Stephen E Cutshall
(Signature)
Address 3150 S. DECATUR BLVD
LAS VEGAS NEV 89102

Name LAURA J. CUTSHALL
(Please print)
Name Laura J. Cutshall
(Signature)
Address 3150 S. DECATUR
LAS VEGAS NEV. 89102

Name RONALD P. HALM
(Please print)
Name Ronald P. Halm
(Signature)
Address 1333 ST. Joseph Circle
LAS Vegas, NV. 89104

Name Debbie HALm
(Please print)
Name Debbie Halm
(Signature)
Address 1333 St. Joseph Cir
LAS VEGAS NV 89104

Name CHARLES F. LONG III
(Please print)
Name
(Signature)
Address 5166 AVENIDA DEL LUNA
LAS VEGAS NEV. 89119

Name RALPH H. ECKARDT
(Please print)
Name
(Signature)
Address 5128 E. CARMEL
LAS VEGAS NEV 89122

Name JUNE ECKARDT
(Please print)
Name JuneAnn Eckardt
(Signature)
Address 5128 E. Carmel
Las Vegas, Nev. 89122

Name Lyle V Craig
(Please print)
Name Lyle V. Craig
(Signature)
Address 1323 Crestwood Ave
Las Vegas Nev.

Name John M Balasen
(Please print)
Name John Balasen
(Signature)
Address 3708 San Joaquin Ave
L.V. Nev. 89102

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Name K HARRINGTON
(Please print)
✓ Name Harrington
(Signature)
Address 1508 CAMPBELL DR
LAS VEGAS, NEV 89102

Name Mark Conz
(Please print)
✓ Name Mark Conz
(Signature)
Address 3327 Vegas Valley #6
Las Vegas NV. 89121

Name ROBERT L. EATES
(Please print)
✓ Name Robert L. Eates
(Signature)
Address 565 [illegible] St
Las Vegas, NV 89110

Name Richard [illegible]
(Please print)
✓ Name
(Signature)
Address 4069 Boston, Las Vegas
Nev 89104

Name ROGER BREWER
(Please print)
✓ Name Roger Brewer
(Signature)
Address 4308 RIVERBANK Cir
LAS VEGAS NV 89103

Name HILLIARD KELLEY
✓ (Please print)
Name Hilliard Kelley
(Signature)
Address 3700 S. LAS VEGAS BLVD SUITE 922
LAS VEGAS NV. 89109

Name Jeane B BOMAN
✓ (Please print)
Name Jeane Boman
(Signature)
Address 1315 Strong Dr
Las Vegas Nev - 89102.

Name RANDY LOCKREY
✓ (Please print)
Name Randy Lockrey
(Signature)
Address 2756 HERITAGE Ct.
LAS VEGAS, NEV. 89121

Name William R TEMPLETON
✓ (Please print)
Name William R Templeton
(Signature)
Address 115 CLAYTON ST.
LV NEV 89110

Name S M. DOUBRAVA
✓ (Please print)
Name S M Doubrava
(Signature)
Address 3121 HASTINGS
LAS Vegas Nevada 89107

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Name THOMAS C. FEHRMAN
(Please print)
✓ Name Thomas C. Fehrman
(Signature)
Address 1500 Pacific St
Las Vegas, Nev 89104

Name W.K. BRYANT III
(Please print)
✓ Name W.K. Bryant III
(Signature)
Address 1840 RUNNINGBEAR DR.
LAS VEGAS NEV 89108

Name TALLULAH BRYANT
(Please print)
✓ Name Tallulah K. Bryant
(Signature)
Address 1840 Runningbear Dr.
LV NV 89108

Name Ken Freshwater
(Please print)
✓ Name Ken Freshwater
(Signature)
Address 1840 Runningbear
LV Nv 89108

Name
(Please print)
Name
(Signature)
Address

Name
(Please print)
Name
(Signature)
Address

Name
(Please print)
Name
(Signature)
Address

Name
(Please print)
Name
(Signature)
Address

Name
(Please print)
Name
(Signature)
Address

Name
(Please print)
Name
(Signature)
Address

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✓
Name CATHY L. HUNTZINGER
(Please print)
Name Cathy L. Huntzinger
(Signature)
Address 5221 Andover Dr
Las Vegas Nev. 89122

✓
Name JAMES J. TAYLOR
(Please print)
Name James J. Taylor
(Signature)
Address 5012 FERWANA LN.
LAS VEGAS. NEV. 89108

✓
Name DAVID F EFNER
(Please print)
Name David F. Efner
(Signature)
Address 5221 Andover Dr
Las Vegas Nev. 89122

✓
Name BEATRICE J. FLYNN
(Please print)
Name Beatrice J. Flynn
(Signature)
Address 4574 S. [illegible]
L. Vegas, NV 89122

Name WILLIAM B LINK
(Please print)
Name William B. Link
(Signature)
Address 121 S TERRA COTTA
LAKE ELSINORE CA. 92330

Name
(Please print)
Name
(Signature)
Address

✓
Name RAY CAMPBELL
(Please print)
Name Ray Campbell
(Signature)
Address 3704 WEST EL CAMINO AVE
LAS VEGAS, NEVADA 89102

Name
(Please print)
Name
(Signature)
Address

✓
Name DON ECOTT
(Please print)
Name
(Signature)
Address 3604 BIRLA AVR
LAS VEGAS 89120

Name
(Please print)
Name
(Signature)
Address

Please mail completed petitions to: Playmate Resort Marinas
322 Lakeshore Road
Boulder City, Nevada 89005

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Name M.E. RITCHIE (Please print)	Name (Please print)
✓ Name M E Ritchie (Signature)	Name (Signature)
Address 939 SANTA HELENA HEND. NV. 89015	Address
✓ Name H. E. PROSCH (Please print)	Name (Please print)
Name H E Prosch (Signature)	Name (Signature)
Address 3899 ALMONDWOOD DR. LAS VEGAS NEV 89120	Address
Name H. A. Neal (Please print)	Name (Please print)
✓ Name H a Neal (Signature)	Name (Signature)
Address 6816 W. Segura Las Vegas, Nev. 89103	Address
Name (Please print)	Name (Please print)
Name (Signature)	Name (Signature)
Address	Address
Name (Please print)	Name (Please print)
Name (Signature)	Name (Signature)
Address	Address

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Name C M ROWEN
(Please print)
Name C M Rowen
(Signature)
Address 4325 N PINAL
KINGMAN AZ 86401

Name WILLIAM A. SLAGUS
(Please print)
✓ Name WILLIAM A. SLAGUS
(Signature)
Address 5300 Ithaca Ave.
L.V. NEV. 89122.

Name John Gerber
(Please print)
Name John Gerber
(Signature)
Address 4186 Vancouver Dr
Las Vegas Nev

Name
(Please print)
Name
(Signature)
Address

Name
(Please print)
Name
(Signature)
Address

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(Signature)
Address

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Name David F Phillips
(Please print)
✓ Name David F Phillips
(Signature)
Address 100 No Pecos St
LV 89101

Name KAREN GAULT
(Please print)
✓ Name Karen Gault
(Signature)
Address 268 Lake Shore DR.
Boulder City, Nev. 89005

Name GENE GARCIA
(Please print)
✓ Name
(Signature)
Address 4503 WISCONSIN
L.V. Nev. 89104

Name DAVID R. HUNT
(Please print)
✓ Name David R. Hunt
(Signature)
Address 6453 SHAWNEE
LV NEV 89107

Name ~~Thomas R Chattin~~
(Please print)
Name ~~6740 E Boulder Hwy~~
(Signature)
Address

Name
(Please print)
Name
(Signature)
Address

Name THOMAS R CHATTIN
✓ (Please print)
Name Thomas R Chattin
(Signature)
Address 6740 Boulder Hwy
LAS VEGAS NV 89122

Name
(Please print)
Name
(Signature)
Address

Name RALPH M. GAULT
✓ (Please print)
Name Ralph M. Gault
(Signature)
Address 268 LAKESHORE DR.
BOULDER City NV 89005

Name
(Please print)
Name
(Signature)
Address

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Name KENT KIZERIAN
(Please print)
Name
(Signature)
Address 2774 Rainier
LV Nev 89122

Name
(Please print)
Name Ned La Rue
(Signature)
Address

Name K. M. S.
(Please print)
Name
(Signature)
Address

Name
(Please print)
Name
(Signature)
Address

Name
(Please print)
Name
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✓

Name SAM DASE
(Please print)
Name
(Signature)
Address 6223 PINEwood
L.V. NV 89103

Name
(Please print)
Name
(Signature)
Address

Name
(Please print)
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Name Jim Appleby
(Please print)
✓ Name Jim Appleby
(Signature)
Address 4997 Rideview Dr.
LV. NV. 89120

Name HARTSON D. WOOD
(Please print)
Name Hartson D. Wood
(Signature)
Address 7557 ~~[illegible]~~ WOODLEY AVE.
VAN NUYS, CALIF 91406

✓ Name JOE BELLOMO
(Please print)
Name Joe Bellomo
(Signature)
Address 3000 ALTA DR.
LV. NV 89128

Name JACK O DeMOTT
(Please print)
Name Jack O DeMott
(Signature)
Address Box 771
Henderson Nev.

GERALD JONES
Name Gerald Jones
(Please print)
Name
(Signature)
✓ Address 165 S 14st
L.V. 89101

Name LARRY LOCATIS
(Please print)
Name
(Signature)
Address 1001 FEATHER PALM
LAKE HAVASU CITY ARIZ

Name E J Miketsch
(Please print)
Name E. J. [illegible]IHITSCH
(Signature)
Address 832 LARK
PLACENTIA CA ~~92686~~ 92670

Name HARLAND GRIFFITH
(Please print)
Name Harland Griffith
(Signature)
Address 10 JADE CIRCLE
LAS VEGAS

Name A Bozdanowicz
(Please print)
Name G. BOZDANOWICZ
(Signature)
Address 3771 CHAPALA DR
LV. NV. 89120

Name
(Please print)
Name
(Signature)
Address

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Name Doug Williams
(Please print)
✓ Name Doug Williams
(Signature)
Address 4367 E. Carey
L.V. NEV. 89115

Name JERRY SMITH
(Please print)
Name Jerry Smith
(Signature)
Address 1267 GENEVIEVE
SAN BERNARDINO 92405

Name JOHN DAVIDSON
(Please print)
Name
(Signature)
Address 1166 W 36TH ST
San Pedro CA. 90731

Name R. Ciani
(Please print)
✓ Name Robert Ciani
(Signature)
Address 805 29TH ST.
Boulder Co. 80302

Name HAROLD JACKY
(Please print)
Name H.C. Jacky
(Signature)
Address 512 S. TONOPAH DR.
LAS VEGAS NV 89106

Name CHARLES T. MURPHY
(Please print)
✓ Name Charles T. Murphy
(Signature)
Address 867. N. LAMB #228
LAS VEGAS NEV. 89110

Name Shirley M. Murphy
(Please print)
Name Shirley M. Murphy
(Signature)
Address 867 N. Lamb Bl #228
Las Vegas. nev. 89110

Name
(Please print)
Name
(Signature)
Address

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(Please print)
Name
(Signature)
Address

Name
(Please print)
Name
(Signature)
Address

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Name Charles R LEDBETTER. (Please print)	Name (Please print)
Name C R Ledbetter (Signature)	Name (Signature)
Address 21921 Seacrest Ln. Huntington Beach Calif 92646	Address
Name M.J. PETERS (Please print)	Name (Please print)
Name Melvin J Peters (Signature)	Name (Signature)
Address 1519 Irene Dr Boulder City	Address
Name HOWARD L YOUNG (Please print)	Name (Please print)
Name Howard L Young (Signature)	Name (Signature)
Address 1111 MARIPOSA WAY BOULDER CITY	Address
Name (Please print)	Name (Please print)
Name (Signature)	Name (Signature)
Address	Address
Name (Please print)	Name (Please print)
Name (Signature)	Name (Signature)
Address	Address

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Name Johnny Sanchez
(Please print)
Name
(Signature)
Address 13928 Homeward St
La Puente Calif 91746

Name CHARLES P CANEPA
(Please print)
✓ Name Charles P Canepa
(Signature)
Address 401 Woodridge
Henderson Nevada 89105

Name PRISCILLA CLOSE
(Please print)
✓ Name Priscilla Close
(Signature)
Address 401 Woodridge
Henderson Nevada 89105

Name DONNE ROMANO
(Please print)
✓ Name Donne Romano
(Signature)
Address 3579 BIG SUR DRIVE
LAS VEGAS, NEV. 89122

Name DENYSE ROMANO
(Please print)
✓ Name Denyse Romano
(Signature)
Address 655 Ave. B
Boulder City, Nev. 89001

Name Sheila McAnlis
(Please print)
✓ Name Sheila McAnlis
(Signature)
Address 3751 S Nellis #146
Las Vegas, Nev. 89121

Name JEFFREY N. CLANTZ
(Please print)
✓ Name Jeffrey N. Clantz
(Signature)
Address 724 S. 9th St.
LV. 89101

Name LAURA L. CLANTZ
(Please print)
✓ Name Laura L. Clantz
(Signature)
Address [illegible] S. [illegible]
LV 89103

Name Leon Kaplan
(Please print)
Name LEON KAPLAN
(Signature)
Address 16457 Mariano Dr
Encino Calif 91436

Name DENNIS K. PETERS
(Please print)
Name Dennis K. Peters
(Signature)
Address 151 So. "F" ST.
OXNARD, CALIF 93030

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✓ Name JOHN R WILLOBY
(Please print)
Name John R Willoby
(Signature)
Address 1121 EASTBERDR
BOULDER CITY NEV.

✓ Name ARTHUR E. ROMAINE
(Please print)
Name Arthur E. Romaine
(Signature)
Address Box 903
Boulder City-Nv. 89005

✓ Name SAM ROMANO
(Please print)
Name Sam Romano
(Signature)
Address 710 YUCCA ST.
BOULDER CITY, NEV 89005

✓ Name James A. Gentry
(Please print)
Name James A Gentry
(Signature)
Address 645 Mt. Blackburn Lane
Boulder City, Nev. 89005

✓ Name Pamela Anne Willoby
(Please print)
Name Pamela A. Willoby
(Signature)
Address 1321 Esther Dr
Boulder, NV. 89005

✓ Name LISHA ROMANO
(Please print)
Name Lisha Romano
(Signature)
Address 710 Yucca St.
Boulder City, Nev. 89005

VAUGHN B PIPER JR
Name Vaughn B. Piper Jr
(Please print)
Name Vaughn B Piper J
(Signature)
Address 710 YUCCA ST
B.C. NEV 89005

✓ Name MICHAEL ANTER
(Please print)
Name Michael Anter
(Signature)
Address 3719 Palos Verdes #13
LVNV 89109

✓ Name Albert Vaughan
(Please print)
Name Albert Vaughan
(Signature)
Address 223 Piute LN
HENDERSON NEV. 89015

Name RICHARD THOMAS
(Please print)
Name Richard Thomas
(Signature)
Address 2216 MEMORIAL CT.
LAS VEGAS, NV.

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Name Alvin Shields
(Please print)
Name Alvin Shields
(Signature)
Address K. L.

Name RANDAL P JACKSON
(Please print)
Name Randal P Jackson
(Signature)
Address 2035 OSWOOD LN RIVIERA
AZ.

Name DAVID E. COOPER
(Please print)
Name David E. Cooper
(Signature)
Address KATHERINE STATION
BULLHEAD CITY, AZ.

Name William B. MATHIES
(Please print)
Name
(Signature)
Address Box 5431
Willow Valley AZ.

Name RON SAUNDERS
(Please print)
Name Ron Saunders
(Signature)
Address PO Box 5854
Mohave Valley

Name ALVEY L. BENSHOOF
(Please print)
Name Alvey L Benshoof
(Signature)
Address Katherine Station
Bullhead City, Az.

Name W. H. Hood
(Please print)
Name W H Hood
(Signature)
Address Katherine Station
Bullhead City, Az.

Name Mertice Kribs
(Please print)
Name MERTICE KRIBS
(Signature)
Address P.O. Box 215
BULLHEAD CITY, AZ 86430

Name ROBERT C. HAYS
(Please print)
Name Robert C. Hays
(Signature)
Address 3201 SYCAMORE
BULLHEAD CITY AZ 8642.

Name SCOTT MESSER
(Please print)
Name Scott Messer
(Signature)
Address PO BOX 9124
BULLHEAD CITY, AZ 86430

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Name Janice Hendren
(Please print)
Name Janice Hendren
(Signature)
Address P.O. Box 8924
Ft Mojave, Az 86427

Name CRYSTAL FlOCKEN
(Please print)
Name Crystal Flocken
(Signature)
Address 310 Santa Cruz
Rivira, Az 86442

Name ARdis T. MATHis
(Please print)
Name Ardis T. Mathis
(Signature)
Address 1623 Riverside Drive
Rivira, Az 86442

Name Helen McConnell
(Please print)
Name Helen McConnell
(Signature)
Address 314 Meander
Rivira, Az. 86442

Name ROBERT E. POWELL
(Please print)
Name Robert E Powell
(Signature)
Address KATHERINE LANDING
BULLHEAD CITY AZ. 86430

Name LARRY L. LOCATIS
(Please print)
Name
(Signature)
Address 1001 [illegible]
Lake Havasu City, Ariz

Name Robin Snow
(Please print)
Name Robin Snow
(Signature)
Address Po Box 3550
Rivira, Arizona 86442

Name F. Baugher
(Please print)
Name Floyd Bougher
(Signature)
Address P.O. BX 1085
KINGMAN, AZ

Name Kenny BesT
(Please print)
Name Kenny Best
(Signature)
Address 13021 Loretta
Santa Ana CA. 92705

Name Rudolph Moly
(Please print)
Name Ru Dolph Moly
(Signature)
Address 645 Eldorn
Rialto Ca 92376

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Name Vergie Kustanborter (Please print)	Name (Please print)
Name Vergie Kustanborter (Signature)	Name (Signature)
Address 982 Seafair Drive Riviera, Arizona 86442	Address
Name Linda Rohrer (Please print)	Name (Please print)
Name Linda Rohrer (Signature)	Name (Signature)
Address 1627 E Marble Canyon Dr. #11 Riviera, Az. 86442	Address
Name JOYCE M. HARRISON (Please print)	Name (Please print)
Name Joyce M. Harrison (Signature)	Name (Signature)
Address P.O. Box 2230 Bullhead City, Ariz. 86430	Address
Name Rose Wiggins (Please print)	Name (Please print)
Name Rose M Wiggins (Signature)	Name (Signature)
Address Box 1390 Bullhead City, Ariz. 86430	Address
Name Rosie Duhalde (Please print)	Name (Please print)
Name Rosalie Duhalde (Signature)	Name (Signature)
Address 900S Katherine St. Bullhead City, Az. 86430	Address

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Name BRAD, Woodman
(Please print)
Name
(Signature)
Address Box 2005 Bull Head
City Az 86430

Name Gregory J Jones
(Please print)
Name Gregory J Jones
(Signature)
Address 2113 Del-Ray
Riviera Az 86442

Name Ray Merritt
(Please print)
Name Ray Merritt
(Signature)
Address 9104, KS, Bhc,
Arizona 86430

Name Steve Range
(Please print)
Name Steve Range
(Signature)
Address Gen. Delivery Katherine landing
Bullhead City Az. 86430

Name
(Please print)
Name
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Address

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Name MARY BEALER
(Please print)
Name Mary Bealer
(Signature)
Address PO Box 1224
Bullhead City, Az. 86420

Name Barbara Jankowski
(Please print)
Name Mickey Jankowski
(Signature)
Address 3413 N 48 St
Phoenix Ariz

Name GARY JOHNSON
(Please print)
Name S.B. Johnson
(Signature)
Address Barbelowe Ca.

Name
(Please print)
Name
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Name Scott Oberdin
(Please print)
Name Scott Oberdin
(Signature)
Address ~~[illegible]~~ PO BOX 9071
KATherine STATION BHC
AZ. 86430

Name ROBERT LEE EIKENBARY
(Please print)
Name Robert Lee Eikenbary
(Signature)
Address 254 MANRA BLD
River ARZ.

Name Ruth C KELLERMAN
(Please print)
Name Ruth C Kellerman
(Signature)
Address 64350 Bay Court
Desert Hot Springs Ca 92240

Name WILLARD A. WEISS
(Please print)
Name Willard A Weiss
(Signature)
Address 23450 LYMAN BLVD
SHAKER HGTS, OHIO
441--

Name LYLE SHERMAN
(Please print)
Name
(Signature)
Address 614 Riverfront DR.
Riviera AZ. 86442

Name
(Please print)
Name
(Signature)
Address

Name
(Please print)
Name
(Signature)
Address

Name
(Please print)
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Name Robert Kear
(Please print)
Name Robert Kear
(Signature)
Address P.O. Box 70
Riviera, Az 86442

Name CHARLES HARTNETT
(Please print)
Name Charles Hartnett
(Signature)
Address Katherine's Landing
Bullhead City, space 12.

Name CHARLES BELARDINELLI
(Please print)
Name Charles Blardinell.
(Signature)
Address 1326 AMHERST #
WLA CAL 90025

Name
(Please print)
Name
(Signature)
Address

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(Please print)
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Address

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(Signature)
Address

Please mail completed petitions to: Playmate Resort Marinas
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Name RICHARD HARWOOD
(Please print)
Name Richard Harwood
(Signature)
Address LAKE MOHAVE RESORT
K.S. BULLHEAD CITY AZ

Name
(Please print)
Name
(Signature)
Address

Name
(Please print)
Name
(Signature)
Address

Name
(Please print)
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Name FRED ROSSI
(Please print)
Name Fred Rossi
(Signature)
Address 500 - ROADRUNNER DR.
RIVIERA, AZ. 86442

Name Eris A. Rossi
(Please print)
Name ERIS A. ROSSI
(Signature)
Address 500 ROADRUNNER DR
RIVIERA, AZ. 86442

Name Betty C. Smith
(Please print)
Name Betty C. Smith
(Signature)
Address Rt 2, Bx 142A
Chico, Ca 95926

Name EUGENE W. SMITH
(Please print)
Name Eugene W. Smith
(Signature)
Address Rt 2 Box 142-A
Chico, Calif

Name
(Please print)
Name
(Signature)
Address

Name
(Please print)
Name
(Signature)
Address

Name
(Please print)
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(Signature)
Address

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Name [illegible]
(Please print)
Name Beverly Minor
(Signature)
Address P.O Box 9142 K-S
Bullhead City, Az 86430

Name MARY J. JONES
(Please print)
Name Mary J. Jones
(Signature) 2097 Balboa Dr
Address P.O. Bx 946
Bullhead City, az. 86430

Name [illegible]
(Please print)
Name
(Signature)
Address [illegible]
[illegible]

Name Eldeen Fleming
(Please print)
Name Eldeen Fleming
(Signature)
Address 1717 Williams Dr.
Riviera Az. 86442

Name Gail Boydston
(Please print)
Name Gail Boydston
(Signature)
Address 1814 Arrowhead
Riviera, Arizona 86442

Name
(Please print)
Name
(Signature)
Address

Name
(Please print)
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(Signature)
Address

Name
(Please print)
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(Please print)
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(Signature)
Address

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Name EARL R. GREEN
(Please print)
Name Earl R. Green
(Signature)
Address 1303 YUCCA
BOULDER CITY NEV. 89005

Name DON HUGHES
(Please print)
✓ Name Don Hughes
(Signature)
Address 2204 JUANA VISTA
LAS VEGAS, NEV 89102

Name
(Please print)
Name
(Signature)
Address

Name
(Please print)
Name
(Signature)
Address

Name
(Please print)
Name
(Signature)
Address

Name
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Address

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Name CAROLE REYNOLDS (Please print)	Name (Please print)
Name Carole Reynolds (Signature)	Name (Signature)
Address 2136 Jeanne Dr.	Address
L.V. Nev. 89108	
Name Micheal albe Micheal Alba (Please print)	Name (Please print)
Name Micheal albe (Signature)	Name (Signature)
Address 2539 ELLIS	Address
L.V., NV.	
Name William (Please print)	Name (Please print)
Name WILLIAM [illegible] (Signature)	Name (Signature)
Address 1221 Ocean Ave	Address
Santa MONICA CA	
Name (Please print)	Name (Please print)
Name ~~[illegible]~~ TOM FRANTZ (Signature)	Name (Signature)
Address 11770 PCH, MALIBU CA.	Address
Name Dr A HAMCHARI (Please print)	Name (Please print)
Name (Signature)	Name (Signature)
Address 226T Westwood BLVD	Address
L.A. CA 90024	

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SPEAK-OUT 0140

Lake Mohave's Flood Control Petition

1. Robert A. Sobali 1411 Granada Riviera Arizona
2. Mildred E. Holleman 8654 Stewart & Gray Rd - Downey Cal
3 Mary McMurray 809 Kallin ave Long Beach CA
4 James T. McMurray Jr 809 Kallin ave Long Beach CA.
5 John Oesdean Box 559 SEDONA AZ 86336
6. Eleanor L. Oesdean Box 559, Sedona Az 86336
7. Jeanne Larson Carefree Resort Bullhead City Ariz.
8 Bruce A. [illegible] P.O. Box 794 [illegible] Ca [illegible]
9 W.C. [illegible] Star Rt Box 79 Phelan Ca 92371
10 Gordon Merrick P.O. Box 268 Bullhead, Ariz. 86430
11 L. N. Jenkins 9207 Buell St Downey Calif.
12 J. W. Oslie 5007 New World Dr. West Glendale Az 85302
13 George Wing 501 El Camino Dr La Habra, Ca. 90631
14 Theodore R. Yeomans 521 El Rancho Dr. La Habra Cal 90631
15 Ruth L. Yeomans 5545 Topaz, Pebble Lake, Ariz.
16. Mary J. Wing, 501 El Camino Dr., La Habra, Ca. 90631
17 Lorraine J. Diersing 9662 Mystic Lane, Anaheim, Ca 92804
18. Robert L. Diersing 9662 Mystic Lane Anaheim Ca 92804
19 Lance B. Tawney, 362 E. Benwood St., Covina, Ca 917
20 Jerome B. Flock 714 Church St Riviera, AZ 92686
21 Gertrude Hall 966 Seafair Dr Riviera Ariz 86442
22 J Herman Hall 966 Sea Fair Dr. Riviera Ariz. 86442
23. Alan H. Sunderman 1416 BEECHWOOD AVE FULLERTON CAL 926
24 D E Smith 1330 Gemstone Riviera
25 Judith A Keeler Box 9008 K.S Bullhead City, Az 86430
26. CHuck BirDwell 3121 Willow Fullerton CAl 92635

27. Thomas Callihan 1304 N Main Centerville Utah
28. George L Mount 6324 Downey Riverside CALIF 92509
29. Gwen B. Marzes 6324 Downey Riverside Ca 92509
30 Gregory T. Stel 9843 Steamboat Dr. Montclair, Ca 91763
31 Karen Westmyer 2307 Gardi Bradbury, Ca 91010
32 Irene Westmyer 2307 Gardi Bradbury, Ca 91010
33 Lamar Brooks 907 Raquel Court Hemet Ca 92343
34 Alice Brooks " 907 Raquel " Ct Hemet Calif
35. Charles Kocourek 103 Manganese Henderson Nevada

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Name S. Kraije
(Please print)
Name Shirley KRAIGE
(Signature)
Address 19179 Lenca Rd.
Apple Valley, CA. 92307

Name ELIZABETH E SMITH
(Please print)
Name Elizabeth E Smith
(Signature)
Address PO Box 1151,
Cottonwood Cove
Nev. 89046

Name MARVIN A SMITH
(Please print)
Name Marvin A Smith
(Signature)
Address PO BOX 1151
COTTONWOOD COVE NV

Name William H. Spiker, Jr.
(Please print)
Name William H. Spiker Jr.
(Signature)
Address P.O. BOX 1124
Cottonwood Cove, Nev. 89046

Name ELEANOR STRADER
(Please print)
Name Eleanor Strader
(Signature)
Address 6328 Fargo Ave
Las Vegas 89107

Name NANCY JANE LAPPIN
(Please print)
Name Nancy Jane Lappin
(Signature)
Address P.O. Box 1125
Cottonwood Cove, Nev 89046

Name STEVE GIDICK.
(Please print)
Name Steve Gidick
(Signature)
Address 1167 E Cypress
Glendale CA

Name Virgil D Lappin
(Please print)
Name Virgil Lappin
(Signature)
Address PO Box 1125
Cottonwood Cove, Nev

Name R.F. LOCKWOOD
(Please print)
Name R.F. Lockwood
(Signature)
Address 14414 STUDEBAKER
NORWALK CALIF

Name Nyra Lockwood
(Please print)
Name Nyra Lockwood
(Signature)
Address 14414 Studebaker
Norwalk, Calif.

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Name DANNY WILLIS
(Please print)
Name Danny Willis
(Signature)
Address P.O. BOX 1096
Cottonwood Cove, NV 89046

Name MRS FRANK PHILO
(Please print)
Name Mrs. Frank Philo
(Signature)
Address 3151 Lama Av
Long Beach Ca 90808

Name ANN O'BRIEN
(Please print)
Name 158 Ida - Las Vegas
(Signature)
Address Ann A. O'Brien

Name Ronald EASTMAN
(Please print)
Name Ronald Eastman
(Signature)
Address 18049 Laurel Park Rd.
Dominguez Hls Cal 90220

Name MARYLIN WILLIS
(Please print)
Name Marylin Willis
(Signature)
Address Box 1096 Cottonwood
Cove, Nev. 89046

Name DEBBIE PLASTER
(Please print)
Name Debbie Plaster
(Signature)
Address P.O. Box 1000
CottonWood Cove NV 89046

Name HELEN SLOAN
(Please print)
Name Helen Sloan
(Signature)
Address 18708 Billings
Carson, Cal. 90746

Name JOHN FRENCH
(Please print)
Name John French
(Signature)
Address BOX 278
~~Se~~ SEARCHLIGHT N.V. 89046

Name Dyke Born
(Please print)
Name DYKE BORN
(Signature)
Address P.O. Box 1000
COTTONWOOD, COVE, NV.

Name Helen Hess
(Please print)
Name Helen Hess
(Signature)
Address Box 1103
Cottonwood Cove, NV 89046

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Name (Please print) CONNIE HALE
Name (Signature) Connie Hale
Address 2701 Stanbridge
Long Beach Cal.
90815

Name (Please print) Barbara Fisher
Name (Signature) Barbara A Fisher
Address 2410 Marcella
W. Covina, Ca 91792

Name (Please print) Irma Runnings
Name (Signature) Irma Runnings
Address C 22
Cottonwood Cove

Name (Please print) George Havelka
Name (Signature) George Havelka
Address P.O. 102.
Searchlight Nev. 89046

Name (Please print) JODY WILDEN
Name (Signature) Jody Wilden
Address 19931 Newhaven Ln.
Hunt. Bch. CA 92646

Name (Please print) SCOTT CAMERON
Name (Signature)
Address 14942 OAKTREE CIR
Hunt. Bch. CA. 92647

Name (Please print) Denise N Spence
Name (Signature) Denise N Spence
Address 13208 Spinning Ave.
Gardena, CA. 90249 -

Name (Please print) Tony WERLY
Name (Signature) Tony Werly
Address 905 Rainier Ct.
Boulder City NEV.

Name (Please print) Shawna Whiteside
Name (Signature) Shawna Whiteside
Address 1301 Alpine Dr.
Boulder City, NV 89005

Name (Please print) James Whiteside
Name (Signature) James L Whiteside
Address 1301 Alpine Dr.
Boulder City, NV. 89005

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Name GLENN A. STANTON
(Please print)
Name Glenn A Stanton
(Signature)
Address 322 NEBRASKA
HENDERSON NEV.

Name [illegible] HENTSCHEL
(Please print)
Name [illegible]
(Signature)
Address P.O. Box 1047
Cottonwood Cove, NEV. 89046

Name JANE VON HENTSCHEL
(Please print)
Name Jane-Von Hentschel
(Signature)
Address P.O. Box 1049
Cottonwood Cove, NV. 89046.

Name PAUL V. COLE
(Please print)
Name Paul V. Cole
(Signature)
Address Po 1008
Cottonwood Cove NV 89046

Name W.H. Williams
(Please print)
Name W.H. Williams
(Signature)
Address 663 ACACIA ST.
L.A. CAL. 90056

Name JOHN A. COOMBS
(Please print)
Name John A. Coombs
(Signature)
Address 4708 E La Villa Marina
Marina del Rey, Ca 90292

Name George Salter
(Please print)
Name GEORGE SALTER
(Signature)
Address P.O. Box 1006
COTTONWOOD COVE NEVADA

Name JOAN M. DENNING
(Please print)
Name Joan M. Denning
(Signature)
Address P.O. 1135
Cottonwood Cove NV 89046

Name WILLIAM PALM
(Please print)
Name William Palm
(Signature)
Address Box 1057
Cottonwood Cove NV 89046

Name TIM TRISK
(Please print)
Name Tim T. Trisk
(Signature)
Address 1308 E. Serenado
Gardena, Calif. 90249

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Name Mrs Earline Rust
(Please print)
Name Mrs. Earline Rust
(Signature)
Address 10745 S. Victoria Sp. 69
Whittier, Ca. 90604

Name ELVERA T. PERONE
(Please print)
Name Elvera T Perone
(Signature)
Address Bx 1004
Cottonwood Cove, Nev 89046

Name BRUCE LANG
(Please print)
Name Bruce Lang
(Signature)
Address 4791 LAGO DR #107
Hunt Bch Calif 92649

Name Richard B. Mitchell
(Please print)
Name Richard B Mitchell
(Signature)
Address 4095 Fruit St Sp. 94C
La Verne, Calif 91750

Name Roy Zimbelman
(Please print)
Name Roy Zimbelman
(Signature)
Address 515 N Wayfield
Orange, Cal. 92667

Name W D CARMAN
(Please print)
Name Wilbur D Carman
(Signature)
Address P.O. Box 1116
Cottonwood Cove NV

Name ALTON COPPEDGE
(Please print)
Name Alton W. Coppedge
(Signature)
Address Space 125
Cottonwood Cove, Nevada

Name GLENNA JONES
(Please print)
Name Glenna Jones
(Signature)
Address 984-4 Riverside Dr
Burbank, Ca 91506

Name Mr. & Mrs. Robert J. Bailey
(Please print)
Name #69 Mrs. Robert J. Bailey
(Signature)
Address #69 Cottonwood Cove Nv

Name JACKIE Coppedge
(Please print)
Name Jackie Coppedge
(Signature)
Address Space 125 P.O. Box 1025
Cottonwood Cove, Nev. 89046

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Name Dennis Spence
(Please print)
Name Dennis Spence
(Signature)
Address 2781 Stanbridge
Long Beach
Cal.

Name FRANK BIVIR III
(Please print)
Name
(Signature)
Address 5771 Anthony ave
Garden Grove Ca 92645

Name [illegible] BEAN
(Please print)
Name [illegible] Bean
(Signature)
Address 314 [illegible] Century
Simi Valley Ca 93063

Name [illegible] Piedmont
(Please print)
Name [illegible] Piedmont
(Signature)
Address 2621 [illegible] Ct.
Simi Valley, Ca. 93065

Name [illegible] White
(Please print)
Name John H. White
(Signature)
Address 4188 [illegible]
Simi Valley, Ca 93063

Name ANGELA GOMBOS
(Please print)
Name Angela [illegible]
(Signature)
Address 1028 So. Sunset Ave
West Covina, Ca 91790

Name Richard Schroeder
(Please print)
Name
(Signature)
Address 1806 Harriman LN
Redondo Bch Ca 90278

Name John Reinartz
(Please print)
Name John Reinartz
(Signature)
Address 14813 Watkins Dr
La Mirada Calif 90638

Name Edythe Reinartz
(Please print)
Name Edyth Reinartz
(Signature)
Address 14813 Watkins Dr
La Mirada Ca 90638

Name ROBERT L. PETERSEN JR
(Please print)
Name Robert L. Petersen
(Signature)
Address 14362 PINEWOOD Rd
TUSTIN, CAL 92680

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Name Elaine E. Malcolm
(Please print)
Name ELAINE E. MALCOLM
(Signature)
Address 2378 S. Cota, Corona
Calif. 91720

Name JOHN B MALCOLM
(Please print)
Name John B Malcolm
(Signature)
Address 2378 So Cota
Corona CA 91720

Name DIANE DILE
(Please print)
Name Diane Dile
(Signature)
Address 1735 N. Brighton
Burbank, Calif 91506

Name BERNARD DILE
(Please print)
Name Bernard Dile
(Signature)
Address 1735 N BRIGHTON
Burbank, Calif.

Name EDWARD I. JONES
(Please print)
Name Edward F Jones
(Signature)
Address 4104 MONTECITO AVE,
LAS VEGAS, NEV. 89110

Name PAUL GAIK
(Please print)
Name Paul Gaik
(Signature)
Address 1616 Greatford Dr.
Henderson Nev.

Name MARIAN M. ANDERSON
(Please print)
Name Marian M. Anderson
(Signature)
Address P.O. Box 5343
Fullerton, Ca 92635

Name Wm. P. Anderson
(Please print)
Name Wm P. Anderson
(Signature)
Address P.O. Box 5343
Fullerton Ca. 92635

Name Michael K Driggs
(Please print)
Name MICHAEL L. DRIGGS
(Signature)
Address 500 Cindertree Ln
BOULDER CITY NV 89005

Name PATRICIA A. DRIGGS
(Please print)
Name Patricia A. Driggs
(Signature)
Address 500 CINDERTREE LN.
Boulder City, NEV 89005

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Name R.M. GRUENDYKE
(Please print)
Name R.M. Gruendyke
(Signature)
Address 668 N. Hawthorne
Ontario Calif 91762

Name Myrna Ford
(Please print)
Name Myrna Ford
(Signature)
Address 603 Brookwood Dr
El Cajon, CA 92021

Judy Derouin
Name Judy Derou
(Please print)
Name Judy Derouin
(Signature)
Address 905 Rosewood
Spring Valley, Ca 92077

Name SHIRA E McDANIEL
(Please print)
Name Shira E McDaniel
(Signature)
Address 4848 [illegible]
San Diego Ca 92117

Name [illegible]
(Please print)
Name George Stouder
(Signature)
Address PO Box 1082
Cottonwood Cove Nev

Name RAY ALEXANDER
(Please print)
Name Ray Alexander
(Signature)
Address 3545 Starline Dr.
Rancho Palos Verde, Calif 90274

Name Juan Alvarez
(Please print)
Name Juan Alvarez
(Signature)
Address Calle 32EE Nº 80-87
Medellin - Colombia
South America

Name GUSTAVO FRANCO
(Please print)
Name CARRERA 78 # 32C39
(Signature) MEDELLIN - COLOMBIA
Address SOUTH AMERICA.

Name FINLEY HOFFMAN
(Please print)
Name Finley Hoffman
(Signature)
Address 12592 BROMONT ST.
SYLMAR, CA. 91340

Name Glee L. Brown
(Please print)
Name Glee L Brown
(Signature)
Address 95 E. Center ST.
Ventura Calif 93001

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Name LEONARD J URBANAVAGE
(Please print)
Name Leonard J Urbanavage
(Signature)
Address Space 209
Cottonwood Cove. Nev.

Name CYNTHIA C. JONES
(Please print)
Name Cynthia C. Jones
(Signature)
Address 4104 MONTEBELLO
AVE LAS VEGAS NEV.

Name Diane Cherbak
(Please print)
Name Diane Cherbak
(Signature)
Address 37755 Lasker
Palmdale, CA 93550

Name E.M. BALLARD
(Please print)
Name Ernest M Ballard
(Signature)
Address 1505 JESS ST
POMONA, CALIF. 91766

Name John D MANN
(Please print)
Name John D Mann
(Signature)
Address 345 Honey Cr.
(China Lake NAS) Ridgecrest Calif

Name RUTH M. KOONTZ
(Please print)
Name Ruth M. Koontz
(Signature)
Address 19812 Shoshone
Apple Valley Calif.

Name Stella May Weeks
(Please print)
Name Stella M. Weeks
(Signature)
Address 210 Platinum
Henderson, Nev 89015

Name JANIS DAWSON
(Please print)
Name ~~Ro.~~ Janis Dawson
(Signature)
Address P.O. BOX 1097
Cottonwood Cove, Nev. 89046

Name Steve Richardson
(Please print)
Name Steve Richardson
(Signature)
Address Box 1431
Mammoth Lakes Ca.

Name [illegible] FAMBRO
(Please print)
Name
(Signature)
Address 5741 SANTA CATALINA
GARDEN GROVE, CA
92645

Please mail completed petitions to: Playmate Resort Marinas
322 Lakeshore Road
Boulder City, Nevada 89005

TO BE PRESENTED TO CONGRESSMAN HARRY REID IN OCTOBER 1983

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Name Clarence J Fischer
(~~Please print~~) sig
Name Clarence Fischer
(Signature)
Address Box 1075
Cottonwood Cove, Nv. 89046

Name Frank N. Spreadbury
(Please print)
Name FRANK N. SPREADBURY
(Signature)
Address 4366 VALLEY LANE
PASO ROBLES CALIF. 93446

Name CORNELL STROUD
(Please print)
Name Cornell Stroud
(Signature)
Address 4661 AVE. ESTRELLAS
YORBA LINDA Ca

Name SANDI STROUD
(Please print)
Name Sandi Stroud
(Signature)
Address 4661 Ave Estrellas
Yorba Linda, Ca 92686

Name T. M. CALLOWAY
(Please print)
Name T. M. Calloway
(Signature)
Address 1574 HAZEL COURT
UPLAND, Ca 91786

Name M.L. CANNON
(Please print)
Name M. L. Cannon
(Signature)
Address St 4710 NEPTUNE
Newport Bch. Ca 92663

Name John O Dodson
(Please print)
Name JOHN O. DODSON
(Signature)
Address 15224 Las Piedras
Victorville Ca 92392

Name K. H. Pearall
(Please print)
Name 9414 Kempster, Ca.
(Signature)
Address K. H. Pearall

Name EARL E. STEPHENS
(Please print)
Name Earl E. Stephens
(Signature)
Address 350 W EASTMORE LN
~~[illegible]~~ ESCONDIDO, CALIF 92026

Name R.K. SAUNDERS
(Please print)
Name R.K. Saunders
(Signature)
Address 946 E. Plymouth
Glendora, Ca 91740.

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Name HAROLD W. PATTERSON
(Please print)
Name MARY L. PATTERSON
(Signature)
Address P.O.B. 1133
COTTONWOOD COVE, NV.

Name JIM RUPE
(Please print)
Name Jim Rupe Jamwym Rupe
(Signature)
Address 2288 Shreve Ave
SIMI VALLEY CALIF 93063

Name FRED HARTMAN
(Please print)
Name Fred Hartman
(Signature)
Address 42234 52nd ST west
QUARTZ HILL CALIF 93534

Name Lynda D. Rupe
(Please print)
Name Lynda D. Rupe
(Signature)
Address 2288 Shreve Ave.
Simi Valley, Ca. 93063

Name Newell CROSS
(Please print)
Name MARIE CROSS
(Signature)
Address PO Box 1073
Cottonwood Cove, Nevada

Name Rick Sykora
(Please print)
Name Rick Sykora
(Signature)
Address 3477 Mono Dr.
Riverside CA

Name Linda Sykora
(Please print)
Name Linda Sykora
(Signature)
Address 3444 Mono Dr.
Riverside, CA 92506

Name FRANKLIN D. WILTSE
(Please print)
Name Franklin D. Wiltse
(Signature)
Address 1956 Hillman Dr
Alta Loma, CA 91701

Name BEVERLY WILTSE
(Please print)
Name Beverly Wiltse
(Signature)
Address 1956 Hillman Dr
Alta Loma, Ca 91701

Name [illegible] Fischer
(Please print)
Name [illegible] Fischer
(Signature)
Address PO Box 1075
Cottonwood Cove, Nev
89046

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Name PHILLIP P MARRON
(Please print)
Name Phillip P Marron
(Signature)
Address 5260 E. 25th St
Long Beach, Ca 90815

Name MARY L. PATTERSON
(Please print)
Name Mary L Patterson
(Signature)
Address P.O. Box 1133
Cottonwood Cove, NV 89046

Name HENRY N. BAYLISS
(Please print)
Name Henry N Bayliss
(Signature)
Address 35141 BAYLISS RD
PO BOX 242 WILDOMAR CA 92395

Name [illegible]ienne Bayliss
(Please print)
Name [illegible] Vivienne Bayliss
(Signature)
Address 35241 Bayliss Rd
Wildomar, Ca 92395

Name AlberT P. McKee
(Please print)
Name Albert P. McKee
(Signature)
Address 1321 W Ave J2 apt 2
Lancaster Ca 93534

Name
(Please print)
Name
(Signature)
Address

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(Signature)
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(Please print)
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Address

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Name Willis Fabry
(Please print)
Name Willis Fabry
(Signature)
Address WILLIS FABRY
POST OFFICE BOX 390
ARCADIA, CALIFORNIA 91006

Name MARGARET F. BADE
(Please print)
Name Margaret F Bade
(Signature)
Address 467 ROSE MARIE DR.
ARCADIA, CA., 91006.

Name CHARLINE H. BETTAG
(Please print)
Name Charline H Bettag
(Signature)
Address 410 So N St
Lompoc Ca 93436

Name BETTY JEAN HILL
(Please print)
Name Betty Jean Hill
(Signature)
Address 474 ROSEMARIE DRIVE
ARCADIA, CAL. 91006

Name J. ERNEST HILL
(Please print)
Name J. Ernest Hill
(Signature)
Address 474 ROSEMARIE DRIVE
ARCADIA, CAL. 91006

Name Karen L. Sanladerer
(Please print)
Name Karen L Sanladerer
(Signature)
Address 1940 Oakwood Ave.
Sierra Madre, CA 91024

Name Barbara F. Sanladerer
(Please print)
Name Barbara F. Sanladerer
(Signature)
Address 1940 Oakwood Ave.
Sierra Madre, Ca. 91024

Name John D. McAlister
(Please print)
Name John D McAlister
(Signature)
Address 465 S. Hudson Ave #5
PASADENA, CA 91101

Name LOREN K SANLADERER
(Please print)
Name Loren K Sanladerer
(Signature)
Address 1940 Oakwood Ave
Sierra Madre CA 91024

Name
(Please print)
Name
(Signature)
Address

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Francis S. Berg
Name FRANCIS S. BERG
(Please print)
Name HELMI M. BERG
(Signature) Helmi M. Berg
Address 5242 CAMBRIDGE AVE.
WESTMINSTER, CA 92683

Name JAMES A. BERG
(Please print)
Name J. Berg
(Signature)
Address 1083 Visalia Dr.
Costa Mesa, Ca 92626

Name DONNA D BERG
(Please print)
Name Donna D. Berg
(Signature)
Address 1083 Visalia Drive
Costa Mesa, Ca 92626

Name DENNIS R BERG
(Please print)
Name Dennis R. Berg
(Signature)
Address 16302 Wayfarer Lane
Huntington Beach, Ca 92649

Name PHYLLIS ACEVEDO
(Please print)
Name Phyllis B. Acevedo
(Signature)
Address 20411 Regal Circle
Huntington Beach Ca. 92646

Name BENJAMIN ACEVEDO
(Please print)
Name Benjamin Acevedo Sr.
(Signature)
Address 20411 Regal Circle
Huntington Beach Ca 92646

Name JANN BERG
(Please print)
Name Jann Berg
(Signature)
Address 16302 Wayfarer Lane
Huntington Beach Ca 92649

Name
(Please print)
Name
(Signature)
Address

Name
(Please print)
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(Signature)
Address

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(Please print)
Name
(Signature)
Address

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Name HAROLD L. SMITH
(Please print)
Name Harold L. Smith
(Signature)
Address 13201 SAFFORD
GARDEN GROVE, Ca. 92643

Name [illegible] M. Smith
(Please print)
Name [illegible]
(Signature)
Address [illegible] 201 [illegible]
[illegible] Grove [illegible]

Name
(Please print)
Name
(Signature)
Address

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(Signature)
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Name EVELYN J ROGERS
(Please print)
Name
(Signature)
Address 224 SAM JONAS ST
LAS VEGAS NV. 87128

Name MICHAEL M. VANCE
(Please print)
Name
(Signature)
Address 2505 PROSPECT
UPLAND, CALIF

Name RICHARD DUNCAN
(Please print)
Name Richard Duncan
(Signature)
Address 572 E. TABERNACLE #L
ST. GEORGE, UT. 84770

Name Thomas J Dwyer
(Please print)
Name
(Signature)
Address 525 W. M. [illegible] pkwy
Mpls, Minn 55419

Name BRIAN T. VAN DEGRIFT
(Please print)
Name Brian T. Van Degrift
(Signature)
Address 2121 REDROCK CT
L.A. CALIF 90039

Name CHARLES A Bennett
(Please print)
Name
(Signature)
Address 6700 E RUSSELL RD
Las Vegas NV 89122

Name Mr. & Mrs. MARK F. DOLAN
(Please print)
Name Virginia Dolan
(Signature)
Address 6869 Celia Vista Dr.
S.D., CA. 92115

Name John m. Hart
(Please print)
Name
(Signature)
Address P.O. Box 144
INYOKERN CA, 93527

Name Rebecca J. HART
(Please print)
Name Rebecca J. Hart
(Signature)
Address P.O. Box 144
Inyokern Ca. 93527

Name DAVID CHRISTIANSEN
(Please print)
Name David L Christiansen
(Signature)
Address 2207 DEL HOLLOW
LKWD CA 90712

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Name ROBERT HUERTO
(Please print)
Name Robert Huerto
(Signature)
Address 24513 NEPTUNE AVE.
CARSON CA. 90745

Name CARL TIERNO
(Please print)
Name Carl J. Tierno
(Signature)
Address 4807 SAWTELLE BL #7
CULVER CITY CA 90230

Name MARCELO RAPELA
(Please print)
Name Marcelo Rapela
(Signature)
Address 5762 ARBOR OAK CR
LAS VEGAS NEV 89122

Name Mike Cicello
(Please print)
Name Mike Cicello
(Signature)
Address 4073 [illegible] Ave,
Las Vegas Nev. [illegible]

Name DONA EMENAKER
(Please print)
Name Dona Emenaker
(Signature)
Address 609 N 14th St
LV NV 89101

Name TED LEONE
(Please print)
Name T. H. Leone
(Signature)
Address 609 N 14th
L.V. NV. 89101

Name ELIZABETH G MITCHELL
(Please print)
Name Elizabeth G Mitchell
(Signature)
Address 6645 PAINTED DESERT
LAS VEGAS NV. 89108

Name LORRAINE PENKSA
(Please print)
Name Lorraine M. Penksa
(Signature)
Address 6820 Fellows Ave
L.V, NV 89115

Name Leo A. Erbele
(Please print)
Name Leo A. Erbele
(Signature)
Address 5222 Varsity Ave.
Las Vegas, NV.

Name LORI MUMFORD
(Please print)
Name Lori Mumford
(Signature)
Address 2101 CREEK WAY
SANDY UT. 84092

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Name CHARLES P MINGEE
(Please print)
Name
(Signature)
Address 3700 BUCHANAN #184
RIVERSIDE, CALIF 92503

Name Joseph Gilleo
(Please print)
Name Joseph F. Gilleo
(Signature)
Address Box 979
Hurricane, Ut. 8473

Name RYMAL HINTON
(Please print)
Name
(Signature)
Address 632E 100S
ST-George Ut. 84770

Name Stephen MOST
(Please print)
Name Stephen Most
(Signature)
Address Box 245
Hurricane Ut 84737

Name SHANNON STEPHENSON
(Please print)
Name Shannon Stephenson
(Signature)
Address 2207 Del Hollow
Lakewood, Ca 90715

Name DAVID CHRISTIANSEN
(Please print)
Name David Christiansen
(Signature)
Address 2207 Del Hollow
Lakewood Ca 90715

Name W.E. Murray
(Please print)
Name W.E. Murray
(Signature)
Address 44317 STANRIDGE AVE.
LANCASTER CA ~~935~~ 93534

Name JAMES GORMAN
(Please print)
Name James Gorman
(Signature)
Address 1049 Eclipse Way
W-Covina Calif 91792

Name Chuck BRIDGES
(Please print)
Name Chuck Bridges
(Signature)
Address 151 N. Monte Vista #25
La Habra Calif. 90631

Name John W. Lyon
(Please print)
Name
(Signature)
Address P.O. Box 571
Overton, Nev 89040

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Name JOHN D HUDRUK
(Please print)
Name John D Hudrik
(Signature)
Address BOX 513
LOGANDALE NEV

Name
(Please print)
Name
(Signature)
Address

Name
(Please print)
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Address

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Name Wallace Clark
(Please print)
Name Wallace Clark
(Signature)
Address Gen Del
Overton

Name
(Please print)
Name
(Signature)
Address

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Address

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Name LAWRENCE B Milton
(Please print)
Name Lawrence B. Milton
(Signature)
Address Box 2328
NELLIS AFB NV. 89191

Name Phil Poynor
(Please print)
Name Phil Poynor
(Signature)
Address 15262 Normandie
Irvine, CA 92714

Name S-E VALLFORS
(Please print)
Name
(Signature)
Address SWEDEN

Name Oscar G. Romero
(Please print)
Name Oscar Romero
(Signature)
Address 243 Bellevue Av
Daly City, CA 94014

Name GARY & ALICE DE JAGER
(Please print)
Name Gary De Jager
(Signature)
Address 6660 RIVERSIDE DR.
CHINO CA. 91710

Name Theodore William Newell
(Please print)
Name Theodore W. Newell
(Signature)
Address 3405 WRIGHT ST.
No. Las Vegas 89130

Name R. E. Stalter
(Please print)
Name R. E. Stalter
(Signature)
Address 17884 Corte Emparrado
San Diego CA 92128

Name C. A. STALTER
(Please print)
Name C. A. Stalter
(Signature)
Address 17884 Corte Emparrado
San Diego, Ca 92128

Name MARIA & Don Young
(Please print)
Name Box 223 Don Young
(Signature)
Address Circleville, Utah

Name
(Please print)
Name Geraldine Mathis
(Signature)
Address BOX 219
Overton Nev 89040

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Name Charles H. Myers
(Please print)
Name CHARLES W. MYERS
(Signature)
Address 1415 Genevieve Apt D
San Bernardino Calif 92405

Name KATHERINE R. MYERS
(Please print)
Name Katherine R. Myers
(Signature)
Address 1415 Genevieve apt D
San Bernardino Calif. 92405

Name Nancy J. Minges
(Please print)
Name Nancy J. Minges
(Signature)
Address 3700 Buchanan #184
Riverside, CA 92503

Name Robert E. Pfeifer
(Please print)
Name Robert E. Pfeifer
(Signature)
Address 2253 Clinton Lane
Las Vegas, Nev. 89115

Name Joanne Nelson
(Please print)
Name Joanne Nelson
(Signature)
Address 7445 S Claret St
Salt Lake City, Ut 84121

Name Connie Rowley
(Please print)
Name Connie Rowley
(Signature)
Address 2181 W. Midwood
Anaheim, Ca. 92804

Name Harry Rowley
(Please print)
Name Harry Rowley
(Signature)
Address 2181 W. Midwood
Anaheim, Ca. 92804

Name
(Please print)
Name
(Signature)
Address

Name JOHN W THOMPSON
(Please print)
Name John W. Thompson
(Signature)
Address 3601 E. Wyoming #264
Las Vegas 89104

Name KATHLEEN M. THOMPSON
(Please print)
Name Kathleen M. Thompson
(Signature)
Address 3601 E. Wyoming #264
Las Vegas, Nev. 89104

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Name (Please print) Tom Brown
✓ Name (Signature) Tom Brown
Address 2358 Rowwidge
Las Vegas NV 89120

Name (Please print) Thomas Tonai
✓ Name (Signature) Thomas Tonai
Address 3014 S. Talbot St.
Las Vegas, Nev. 89109

Name (Please print) Larry Slover
Name (Signature) Larry Slover
✓ Address Box 43798
Las VEGAS, NV. 89116

✓ Name (Please print) MARY ANN Johnson
Name (Signature) Mary Ann Johnson
Address 2617 Flower Avenue
North Las Vegas, Nevada 89030

Name (Please print) Ronald Achtabowski
✓ Name (Signature) RONALD ACHTABOWSKI
Address 231 A BROOKSIDE LN
LV NE 89107

Name (Please print) Harley C Parvin
Name (Signature) Harley C Parvin
Address 4164 Hillview
Las Vegas, NV 89110

Name (Please print) NORM Willey
Name (Signature) Norm Willey
Address 861 Aspen Cir
L.V. Nev. 89101

Name (Please print) Lloyd P. DOCKENDORF
✓ Name (Signature) Lloyd P. Dockendorf
Address 5917 E drive
Las Vegas. NV. 89108

Name (Please print) Louis E. Johnson
✓ Name (Signature) Louis E Johnson
Address 2617 Flower Ave
N Las Vegas Nev 89030

Name (Please print) RALPH Hart JONES
✓ Name (Signature) Ralph Hart Jones
Address 2576 E. Charleston blvd
382-4358 LV Nev 89104

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Name IRENE HARRISON
(Please print)
Name Irene Harrison
(Signature)
Address 867 N. LAMB
LAS VEGAS, NV 89110

Name Betty Lou Schwasinger
(Please print)
Name Betty Lou Schwasinger
(Signature)
Address 540 E. Oakey #106
Las Vegas, Nevada 89104

Name Barbara J. Lewox
(Please print)
Name 3649 Apt C4
(Signature)
Address Barbara
L. V. NV 89115

Name R.H. BAYLESS
(Please print)
Name RH Bayless
(Signature)
Address 2513 Sea Biscuit
Las Vegas NV 89108

Name PATRICIA C OLSEN
(Please print)
Name Pat Olsen
(Signature)
Address 4020 SAGUARO LN
LAS VEGAS NV 89110

Name TERRY COVINGTON
(Please print)
~~Name~~ Terry Covington
(Signature)
Address 1309 Hewitt St
LAS VEGAS Nev 89109

Name Lawrence D Godfrey
(Please print)
Name LAWRENCE D. Godfry
(Signature)
Address 5908 Pebble Beach
Las Vegas, Nev 89108

Name Robert D. WOLFE
(Please print)
Name Robt D Wolfe
(Signature)
Address 2551 Athena
Las Vegas NV 89115

Name Nicholas J MUSCARI
(Please print)
Name Nicholas J [illegible]
(Signature)
Address 4130 Munford Dr.
Las Vegas Nev 89104

Name BRIAN ADAMS
(Please print)
Name
(Signature)
Address 1711 SENIC RIDGE
LAS VEGAS, NV.

Please mail completed petitions to: Playmate Resort Marinas
322 Lakeshore Road
Boulder City, Nevada 89005

TO BE PRESENTED TO CONGRESSMAN HARRY REID IN OCTOBER 1983

PETITION

We, the undersigned, believe the flood control plan currently in use on Lake Mead and Lake Powell is dangerously insufficient to protect the environmental, recreational and economic well-being of the entire Lower Colorado River Region. We demand that a flood control plan be adopted that will allow the full use of recreational facilities and beaches on all the lakes plus insure the safety of those businesses and individuals located along the Colorado River.

Name DENNIS J. ANDERSON
(Please print)
Name Dennis J Anderson
(Signature)
Address 1379 DORTOHY A.V.
LAS Veges NV. 89104

Name Michael DeSilvio
(Please print)
Name Mike DeSilvio
(Signature)
Address 1700 Ferrel
LAS Veges Nev. 89101

Name RANDALL A. BRUCE
(Please print)
Name Randall A. Bruce
(Signature)
Address 6240 Lawton
Las Vegas Nevada 89107

Name
(Please print)
Name
(Signature)
Address

Name
(Please print)
Name
(Signature)
Address

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Name
(Signature)
Address

Please mail completed petitions to: Playmate Resort Marinas
322 Lakeshore Road
Boulder City, Nevada 89005

APPENDIX B

REPAIR OF NATIONAL PARK SERVICE FACILITIES

The National Park Service has developed estimates of the cost of repairing facilities at Glen Canyon National Recreation Area and Lake Mead National Recreation Area damaged by high water levels in 1983. These estimates also address damages suffered by concessionnaires in both National Recreation Areas.

SUMMARY

OF

GLEN CANYON SURVEY

AND

ESTIMATES OF HIGH WATER DAMAGE REPAIR

September 30, 1983

Hite	$ 212,000
Halls Crossing	170,000
Bullfrog	1,050,000
Rainbow Bridge	120,000
Wahweep	1,138,000
Lone Rock	20,000
Lees Ferry	156,000
Total	$2,866,000

SUMMARY
OF
LAKE MEAD DEVELOPED AREA SURVEY
AND
ESTIMATES OF HIGH WATER DAMAGE REPAIR

September 30, 1983

Hemenway Harbor		$ 67,000
Boulder Beach		41,950
Lake Mead Marina		503,245
Las Vegas Wash		141,300
Callville Bay		262,400
Echo Bay		253,800
Overton Beach - less T.V. & Store		359,900
Stewart Point		2,800
Temple Bar		241,400
South Cove		32,500
Pearce Ferry		15,900
	Total	$1,922,195
Design and project supervision + 10%		190,000
		$2,112,195
+ Overton Beach trailer village and store		627,750
	Total	$2,739,945

APPENDIX C

United States
Department of
Agriculture

Soil
Conservation
Service

P.O. Box 2890
Washington, D.C.
20013

December 2, 1983

Mr. James A. Jensen
House Science and Technology Committee
Subcommittee on Investigations and
Oversight
819 House Office Building Annex 1
Washington, D.C. 20515

Dear Jim:

Enclosed are mountain snowpack maps for January 1, 1983, through May 1, 1983, charts for seven SNOTEL sites comparing daily snow water equivalent for water years 1981, 1982, and 1983, and copies of the January 1 through May 1, 1983, Water Supply Outlook reports for the Western United States. This material is for your use in supplying additional information into the record of the recent congressional hearings on the Colorado floods held in Las Vegas, Nevada, on October 14, 1983.

If I can be of further assistance, please do not hesitate to contact me.

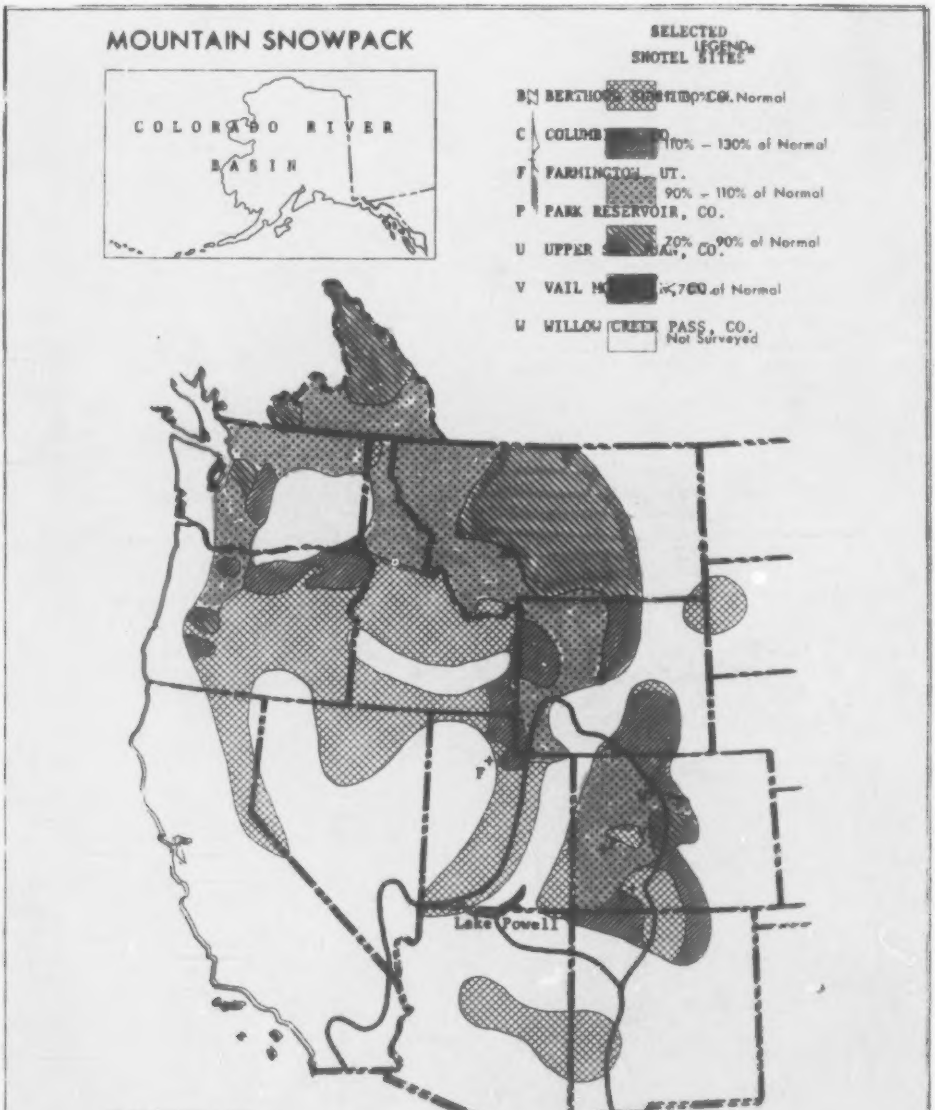
Sincerely,

F. Michael Gunn
F. MICHAEL GUNN
Director, Legislative Affairs

Enclosures

The Soil Conservation Service
is an agency of the
Department of Agriculture

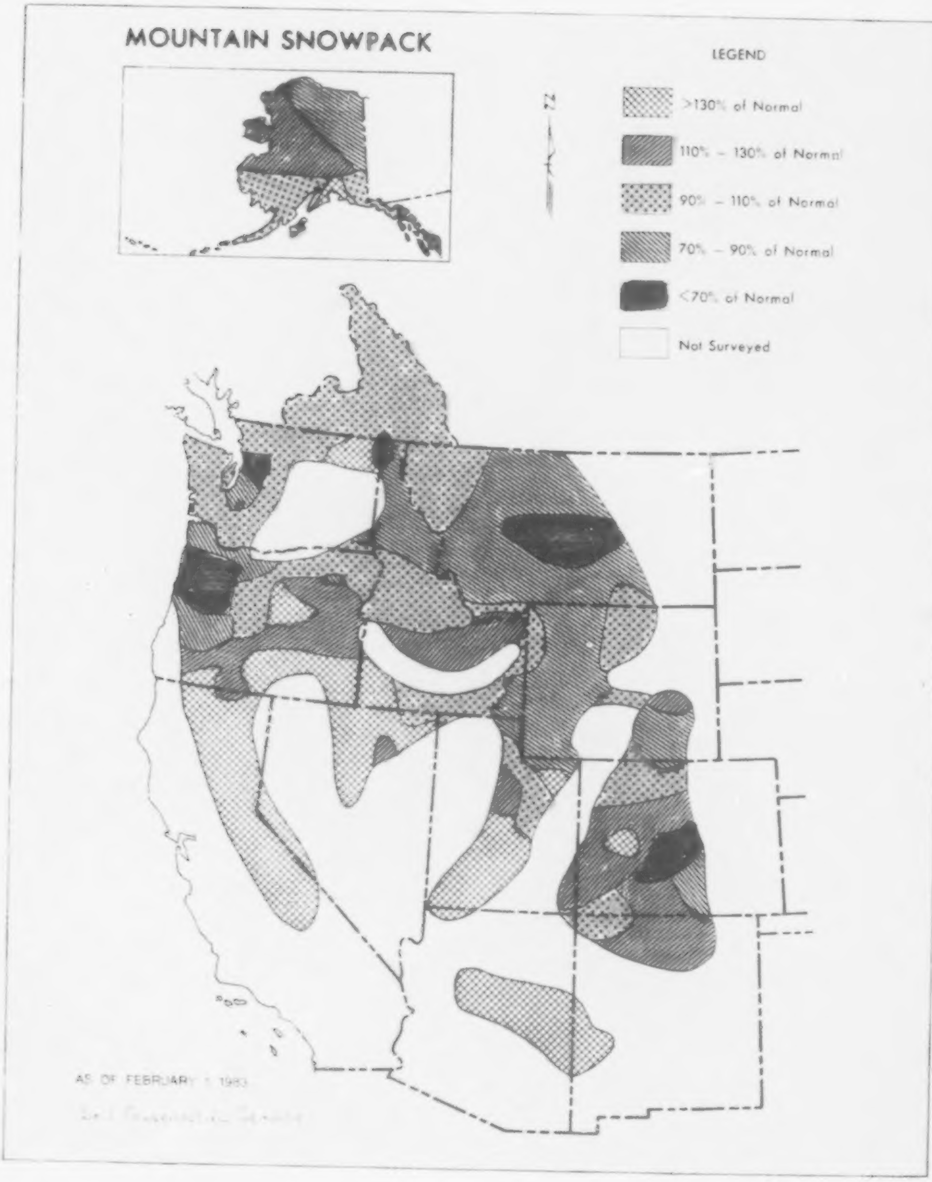
WO-AS-1
10-79

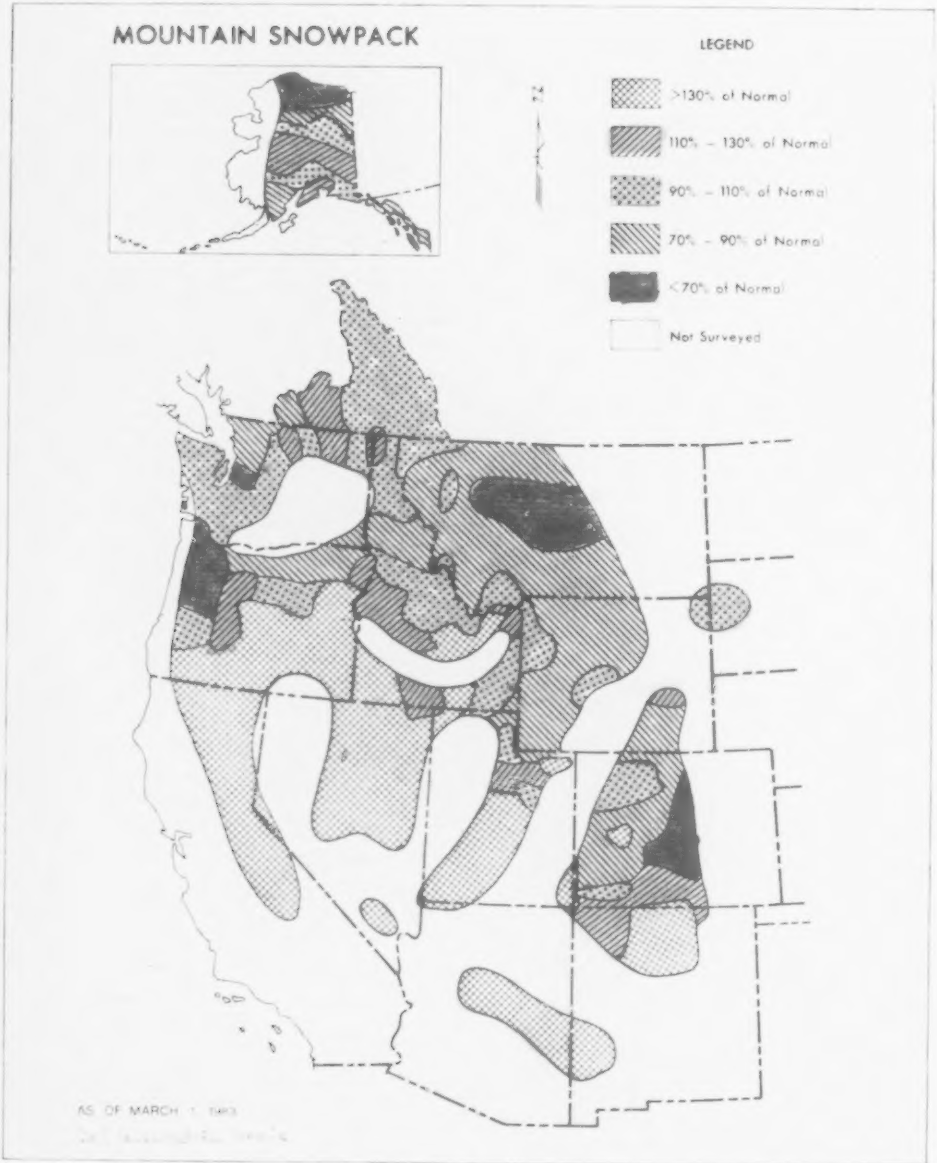

MOUNTAIN SNOWPACK
COLORADO RIVER
BASIN
SELECTED
SNOTEL SITES
LEGEND
B BERTHOUD SUMMIT, CO.
C COLUMB
F FARMINGTON, UT.
P PARK RESERVOIR, CO.
U UPPER
V VAIL M
W WILLOW CREEK PASS, CO.
130% Normal
110% – 130% of Normal
90% – 110% of Normal
70% – 90% of Normal
<70% of Normal
Not Surveyed
F
Lake Powell

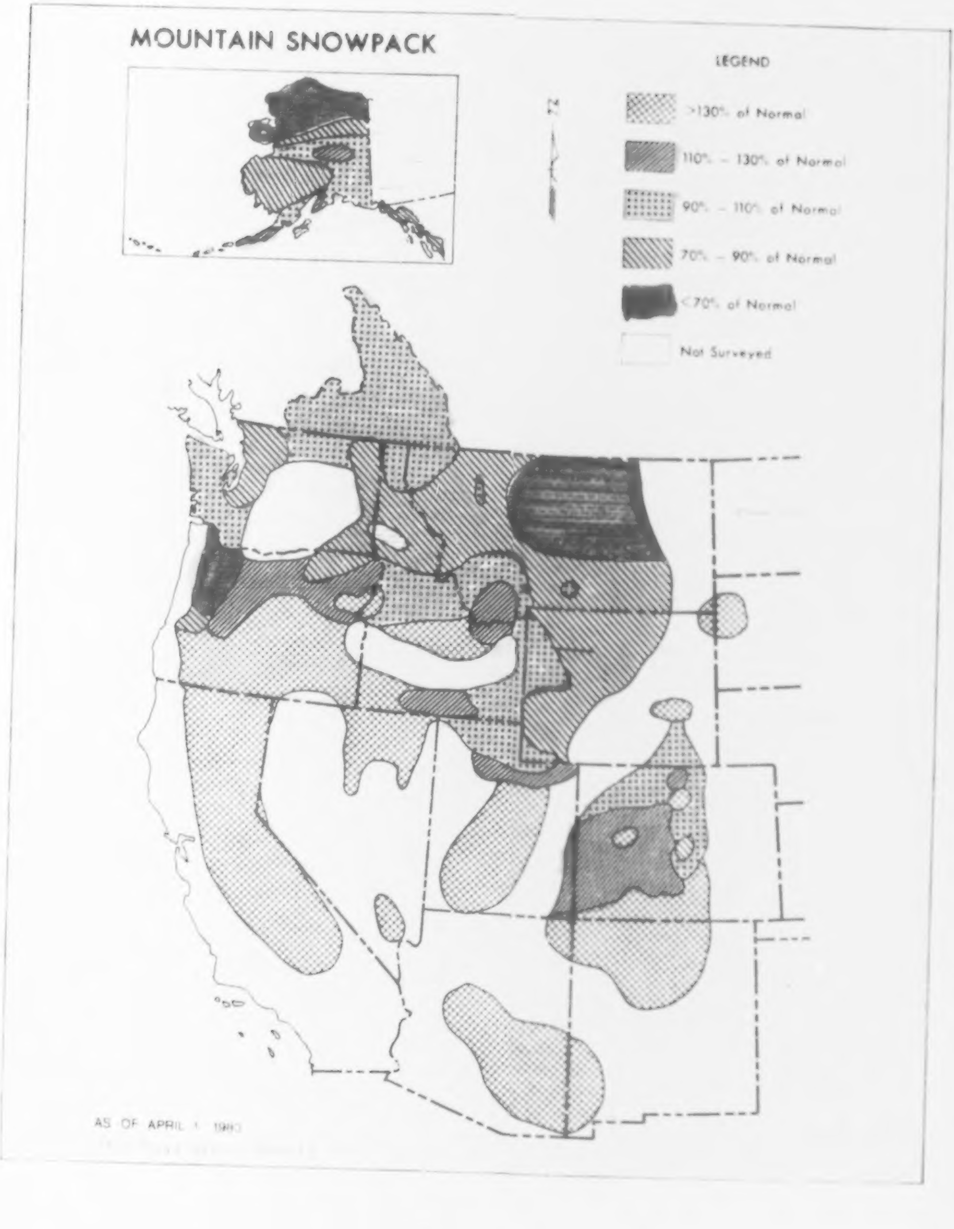
AS OF JANUARY 1 1983

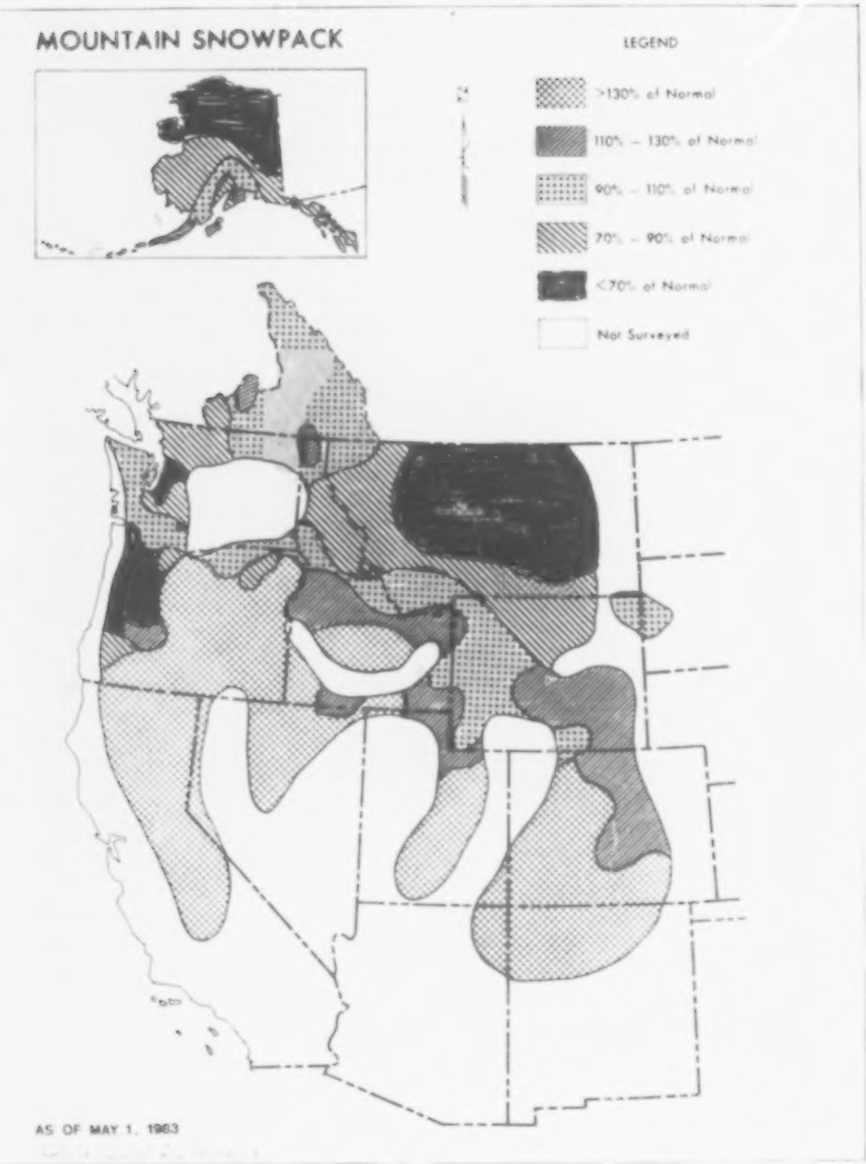
Soil Conservation Service

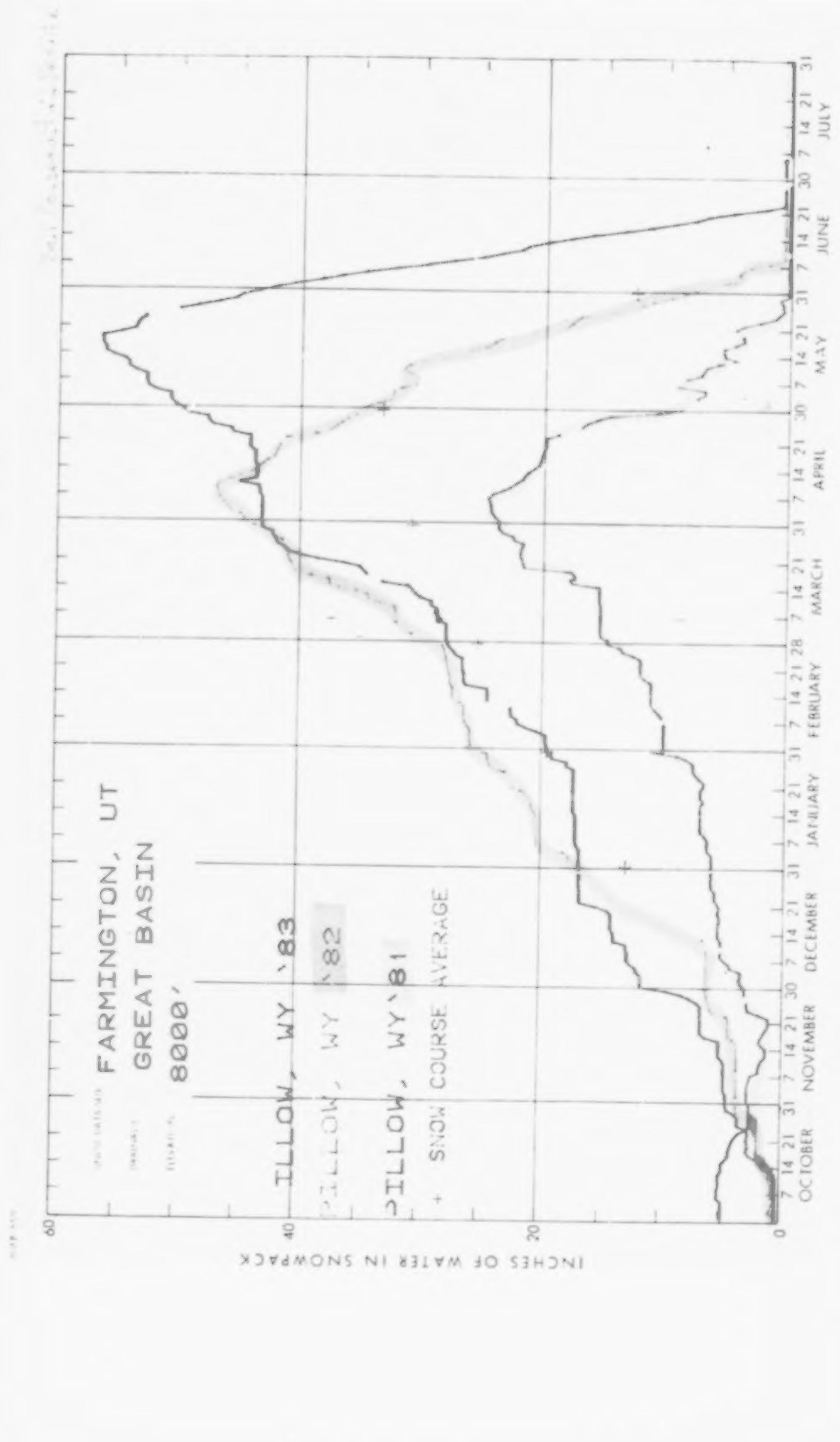
78 SNOTEL sites above Lake Powell, 24 below. SNOTEL system wide has 480 sites.

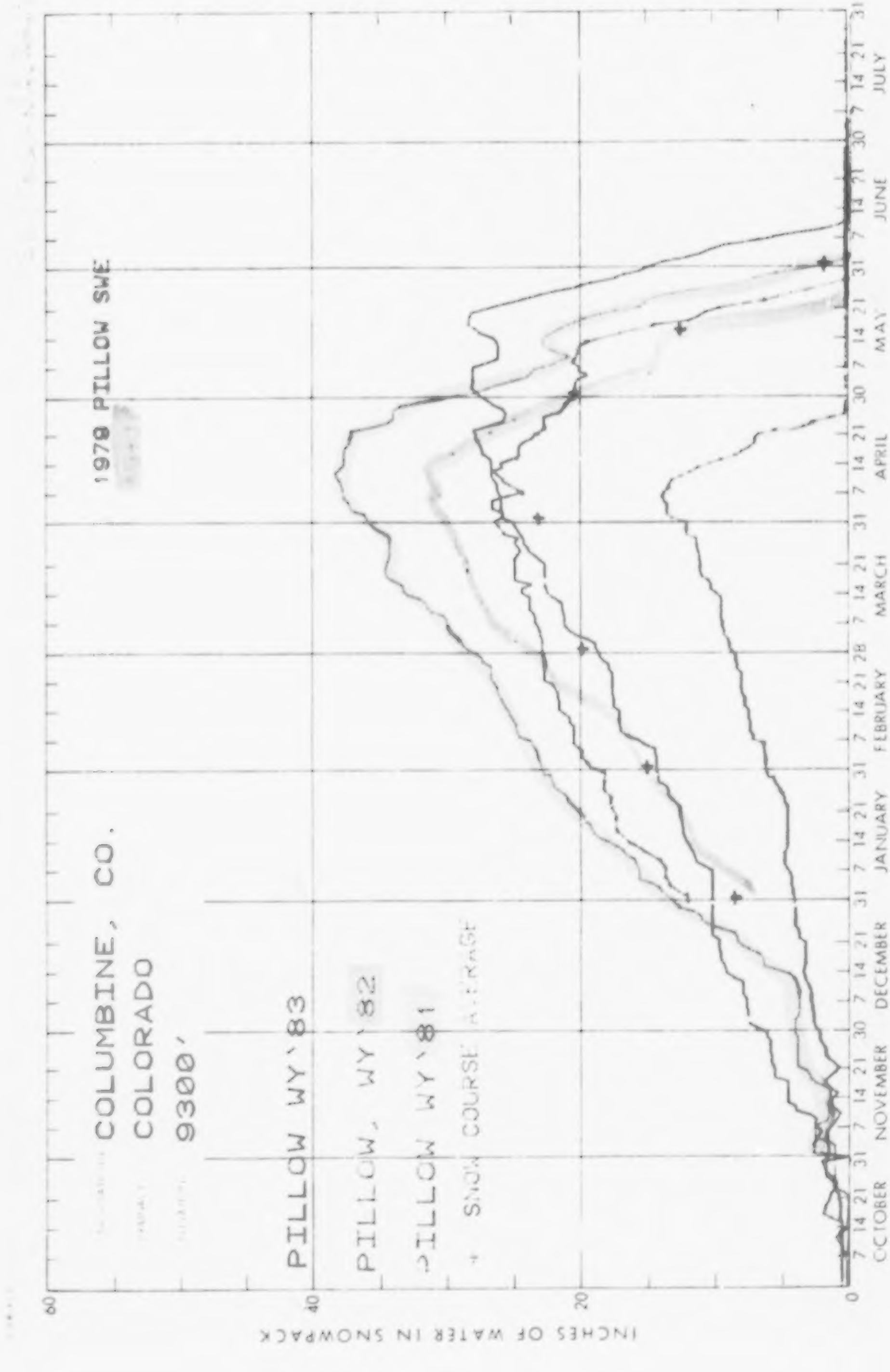

MOUNTAIN SNOWPACK
LEGEND
▨ >130% of Normal
▨ 110% – 130% of Normal
▨ 90% – 110% of Normal
▨ 70% – 90% of Normal
■ <70% of Normal
☐ Not Surveyed
N
AS OF FEBRUARY 1, 1983
Soil Conservation Service


MOUNTAIN SNOWPACK
LEGEND
>130% of Normal
110% – 130% of Normal
90% – 110% of Normal
70% – 90% of Normal
<70% of Normal
Not Surveyed
N
AS OF MARCH 1, 1983


MOUNTAIN SNOWPACK
LEGEND
>130% of Normal
110% – 130% of Normal
90% – 110% of Normal
70% – 90% of Normal
<70% of Normal
Not Surveyed
N
AS OF APRIL 1, 1980


MOUNTAIN SNOWPACK
LEGEND
>130% of Normal
110% – 130% of Normal
90% – 110% of Normal
70% – 90% of Normal
<70% of Normal
Not Surveyed
AS OF MAY 1, 1983


FARMINGTON, UT
GREAT BASIN
8000'
ILLOW, WY '83
PILLOW, WY '82
PILLOW, WY '81
+ SNOW COURSE AVERAGE
INCHES OF WATER IN SNOWPACK
0
20
40
60
7 14 21 31 OCTOBER
7 14 21 30 NOVEMBER
7 14 21 31 DECEMBER
7 14 21 31 JANUARY
7 14 21 28 FEBRUARY
7 14 21 31 MARCH
7 14 21 30 APRIL
7 14 21 31 MAY
7 14 21 30 JUNE
7 14 21 31 JULY


COLUMBINE, CO.
COLORADO
9300'
PILLOW WY'83
PILLOW, WY'82
PILLOW WY'81
+ SNOW COURSE AVERAGE
1970 PILLOW SWE
INCHES OF WATER IN SNOWPACK
0
20
40
60
OCTOBER
NOVEMBER
DECEMBER
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
7 14 21 31
7 14 21 30
7 14 21 31
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7 14 21 28
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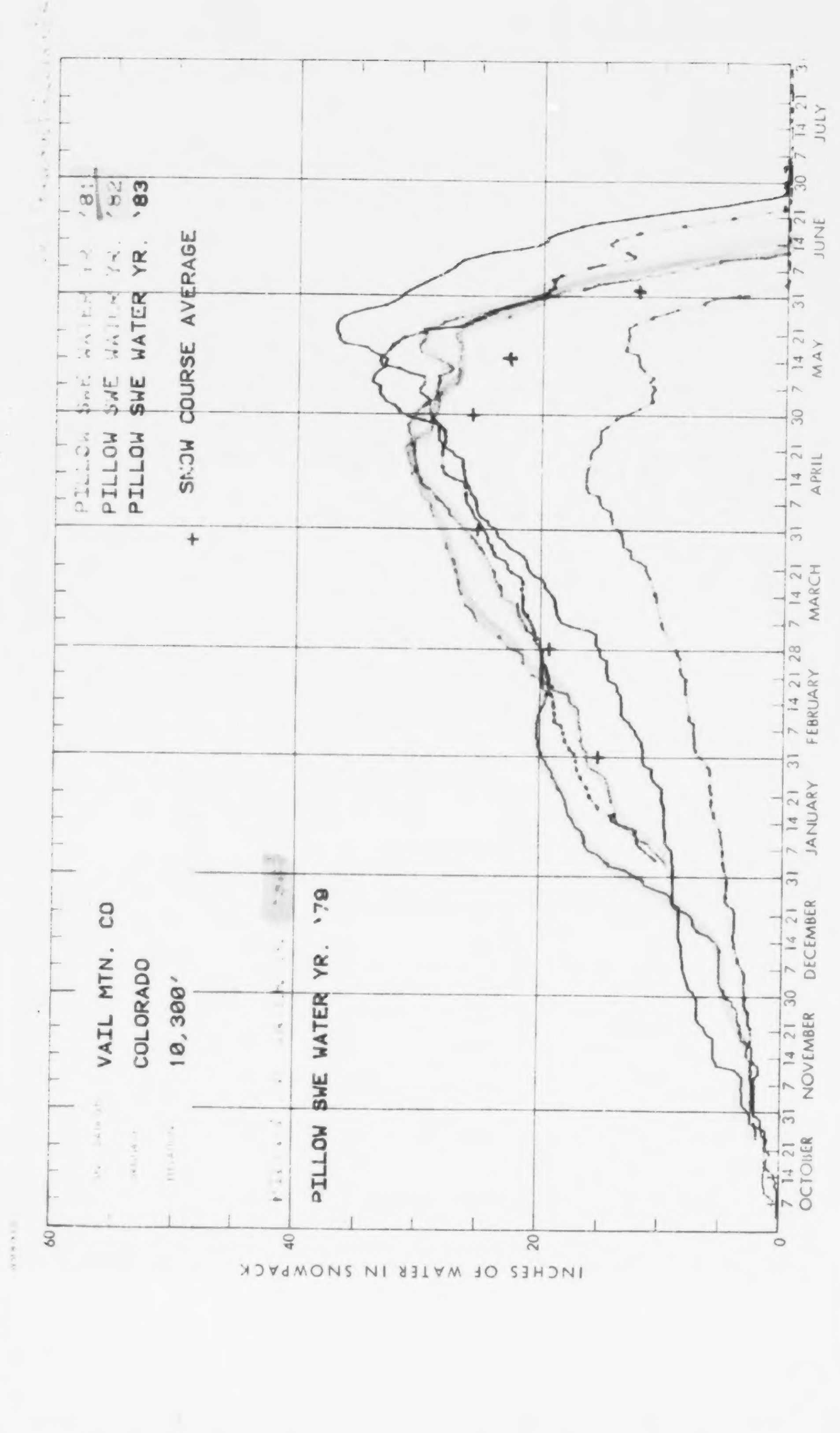
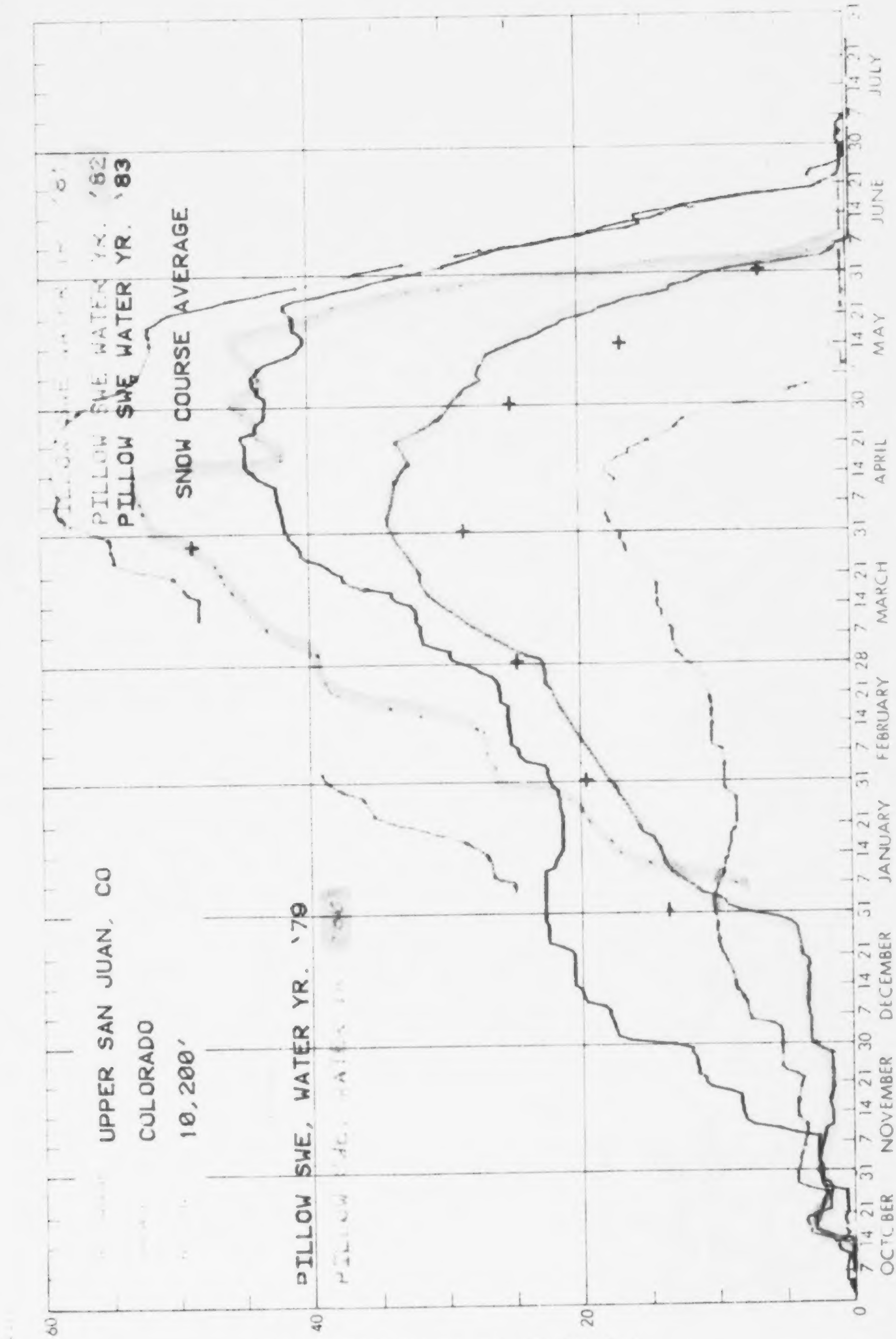
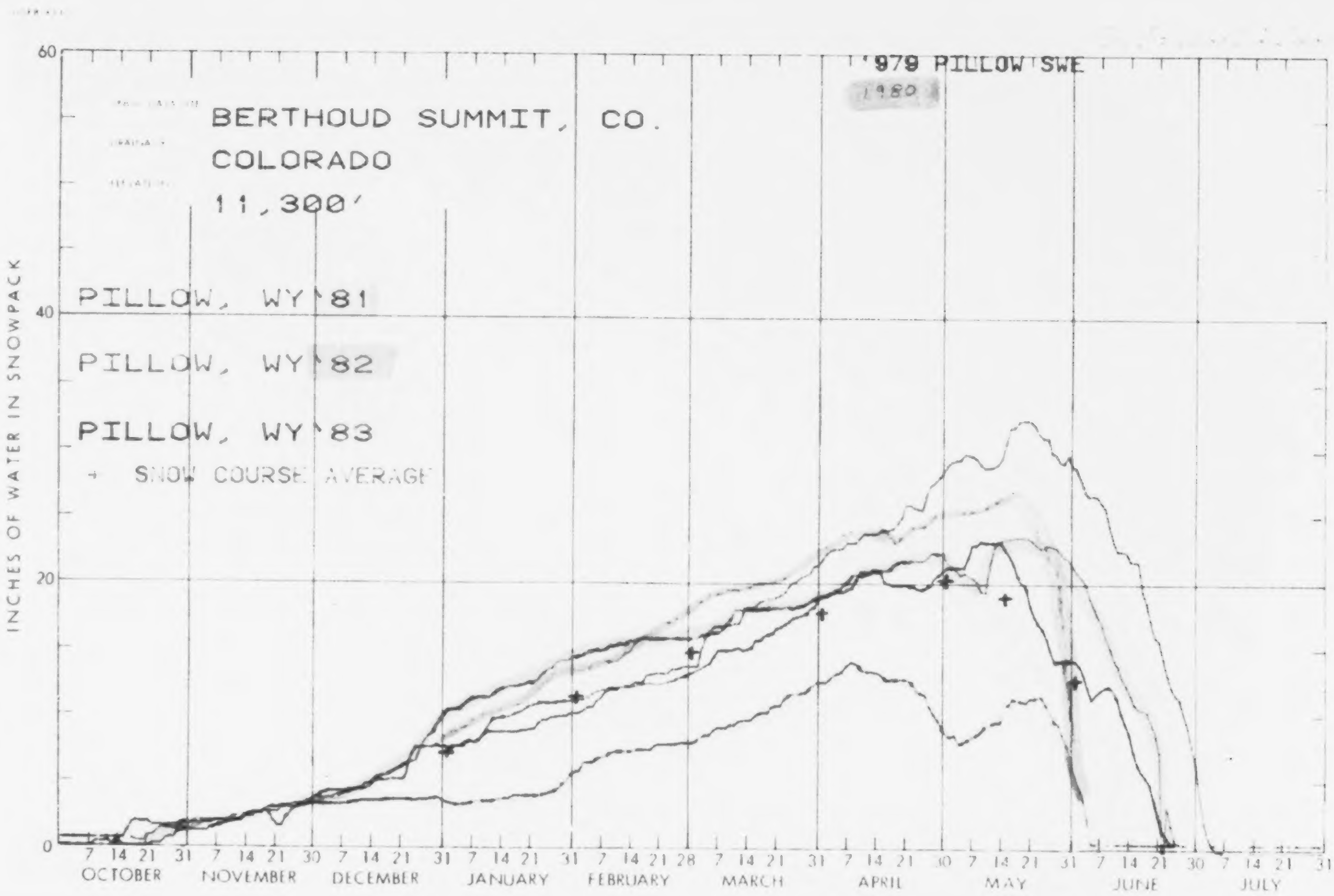
7 14 21 30
7 14 21 31
7 14 21 30
7 14 21 31


VAIL MTN. CO
COLORADO
10,300'
PILLOW SWE WATER YR. '79
PILLOW SWE WATER YR. '81
PILLOW SWE WATER YR. '82
PILLOW SWE WATER YR. '83
+ SNOW COURSE AVERAGE
INCHES OF WATER IN SNOWPACK
0
20
40
60
7 14 21 31 OCTOBER
7 14 21 30 NOVEMBER
7 14 21 31 DECEMBER
7 14 21 31 JANUARY
7 14 21 28 FEBRUARY
7 14 21 31 MARCH
7 14 21 30 APRIL
7 14 21 31 MAY
7 14 21 30 JUNE
7 14 21 31 JULY


UPPER SAN JUAN, CO
COLORADO
10,200'
PILLOW SWE, WATER YR. '79
PILLOW SWE WATER YR. '82
PILLOW SWE WATER YR. '83
SNOW COURSE AVERAGE
INCHES OF WATER IN SNOWPACK
0
20
40
60
OCTOBER
NOVEMBER
DECEMBER
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY


BERTHOUD SUMMIT, CO.
COLORADO
11,300′
PILLOW, WY '81
PILLOW, WY '82
PILLOW, WY '83
+ SNOW COURSE AVERAGE
'979 PILLOW SWE
1980
INCHES OF WATER IN SNOWPACK
60
40
20
0
7 14 21 31 7 14 21 30 7 14 21 31 7 14 21 31 7 14 21 28 7 14 21 31 7 14 21 30 7 14 21 31 7 14 21 30 7 14 21 31
OCTOBER
NOVEMBER
DECEMBER
JANUARY
FEBRUARY
MARCH
APRIL
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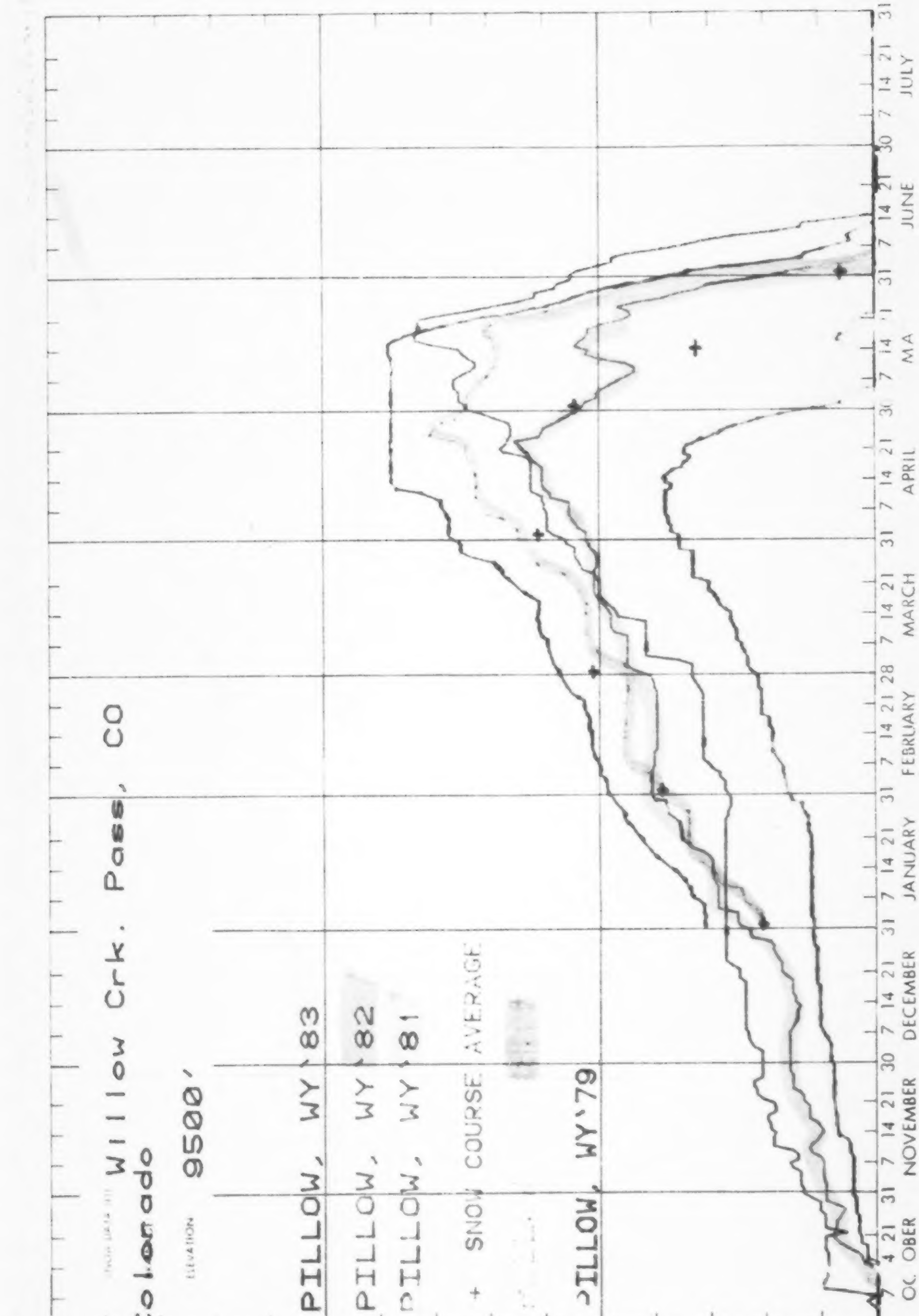
JUNE
JULY


Willow Crk. Pass, CO
Colorado
ELEVATION 9500'
PILLOW, WY'83
PILLOW, WY'82
PILLOW, WY'81
+ SNOW COURSE AVERAGE
PILLOW, WY'79
INCHES OF WATER IN SNOWPACK
0
10
20
30
OCTOBER
NOVEMBER
DECEMBER
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
7 14 21 31
7 14 21 30
7 14 21 31
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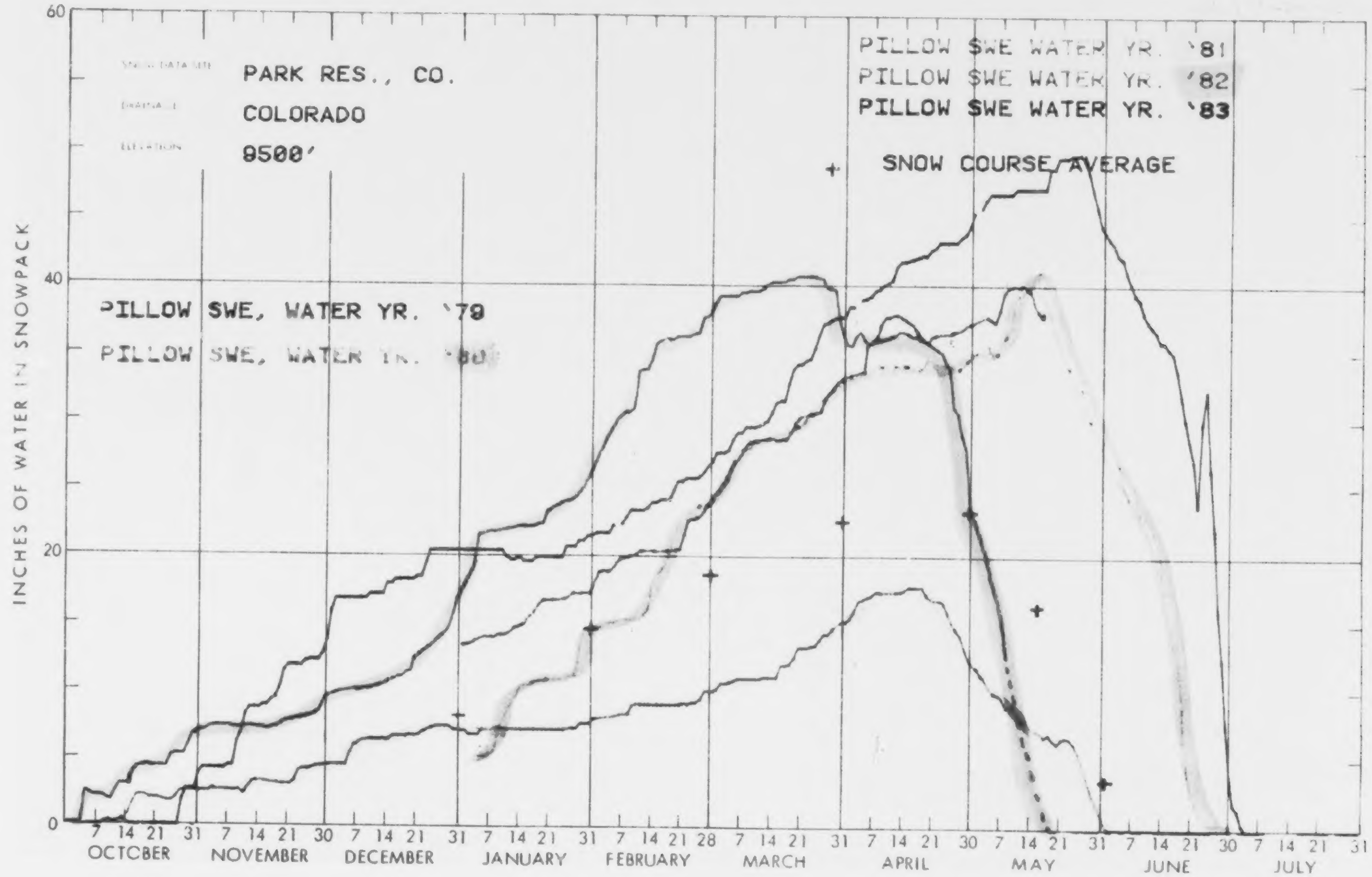
7 14 21 31
7 14 21 30
7 14 21 31


SNOW DATA SITE
PARK RES., CO.
DRAINAGE
COLORADO
ELEVATION
9500'
PILLOW SWE, WATER YR. '79
PILLOW SWE, WATER YR. '80
PILLOW SWE WATER YR. '81
PILLOW SWE WATER YR. '82
PILLOW SWE WATER YR. '83
SNOW COURSE AVERAGE
INCHES OF WATER IN SNOWPACK
0
20
40
60
7 14 21 31 7 14 21 30 7 14 21 31 7 14 21 31 7 14 21 28 7 14 21 31 7 14 21 30 7 14 21 31 7 14 21 30 7 14 21 31
OCTOBER
NOVEMBER
DECEMBER
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY

APPENDIX D

TESTIMONY OF LOIS PERKINS

PRESIDENT OF MOAPA VALLEY CHAMBER OF COMMERCE

PRESIDENT OF MOAPA VALLEY SENIORS - NEVADA STATE PARK COMMISSIONER

REPORTER FOR VALLEY HERALD OVERTON, NEVADA

Moapa Valley, a green oasis on the northern tip of the Overton Arm of Lake Mead has had some bad changes during the past few months, due at least in part to the inundation of Overton Beach Resort and the Overton Wildlife Area. It is generally believed the high waters of the Lake covering these and other shoreline areas was not necessary. It has happened we believe, due to the poor judgment and management of those in key positions managing the reservoirs on the Colorado River.

The Valley formerly being largely a farming and dairying community, has changed over the last twenty-six years to more of a residential community. Acreage that was used for growing vegtables has for the most part been divided up and is now home sites. This change has come about due to market competition from large corporations, the demand for better living conditions for migrant workers and the retiring of the growers due to age.

Along with the changes and growth in population, has generated more of an interest in recreation. With the construction of the Reid Gardner coal generating plant in Moapa and it's now four units, this has brought employment for many who would formerly have left the Valley. The Simplot Silica Sand Inc. has also upgraded their operation hiring under better conditions than former employers. Many also commute to the Las Vegas area to employment.

With construction of trailer courts, improved highways and a full time medical facility, the Valley has an influx of senior citizens each year who spend from seven to eight months here.

Each of these changes has generated more demand for recreation, and living on the tip of the Overton Arm it has been a favorite spot for many to just move through spending a week or a month at this favorite location.

The spring and summer of 1983 was a real bummer when it came to recreation on Lake Mead, and with the TV news casts showing the Overton Arm including the restuarant, store, and trailer village all going under water. Damage was done that will take many years to erase.

Communities in Moapa Valley, especially Overton has enjoyed that "extra" that was brought into their businesses by the recreation and migrant visitors. It helped smooth over the rough spots and allow them the improvements they needed.

But now it is as one elderly gentleman stated, "Even though the beach was not closed, many people thought it was. As one of the evacuees of the Beach trailer village, I would like to say I have been at six different Concessions around the Lake. I have lived at the Overton Beach for the past 23 years, mine was one of the first large mobile homes brought in. Overton Beach is the stop over for many people. They stop here when they come into the State, visit, mabe do a little fishing and find out about the rest of the Lake, then they move on. When they are returning to their homes, they stop at Overton again, rest up a few days and then go home. Now there are none of these so called "snow birds", no traffic at all. Usually there are from 100 to 250 rigs coming in, and the ones already set up on the point. With that many people it is really a shot in the arm for local businesses," Bob Rankin said.

In a report from the Supervisor of the Overton Wildlife Area just south of Overton, he stated they had the Lake within 50 yards of their Shop. In giving an estimate as to the damage to this favorite hunting area, he said a dollar and cent value was not yet possible.

150 acres of cultivated fields, with these mostly planted in early fall barley were lost. The new barley crop makes a deep green forage and is an attraction to the thousands of duck and geese useing this site as a winter or rest up area. The birds love to set down in the new green shoots and graze according to the supervisor.

61 acres of alkali bullrush was lost, and this is referred to as the bread and butter crop for the ducks and geese, it is usually flooded and they love this food.

185 acres of ponds have been lost due to the high water of the Lake. Feour, Wilson and Center ponds have all been lost due to the length of time they have been deep in water.

500 acres of wildlife land covered with natural vegetation for quail, rabbits, pheasant and other small game was lost. 3 miles of cement ditches and approximately 5 miles of interior roads have been lost along with 28 blinds for hunting and several

irrigation structures for water control are all gone.

Much of the bird area is still under water and in the drying out stage, so it will be sometime before a complete list is available.

The effect on hunting for recreation this year will be cut 50%, it will be a mini hunt rather than the full facility with only one pond left and at most 40 acres of bull rush.

What will happen to the migration of the water fowl usually useing the Overton Wildlife Area is very much in doubt. With his years of experience, the supervisor stated he felt many of the water fowl will go right by on seeing the larger expanse of water.

This also will cut down business take in the Valley this year, and it was already bad enough.

Land Brokers Inc. a real estate owned by Bob Lewis and others in Overton, is another loser due to the high water at the Overton Arm of Lake Mead. Lewis stated he had a real good business until this year, "since the Lake closed the Overton Beach facility, things have been real slow. This is the first month in many years that I have had to "feed the kitty", we didn't take in enough to pay help and utilities."

Motel Owners suffered a financial loss, with it reported in June of 1983 there were 60% less people than the former year. July business was less than 50% of normal with August still being down worse at 65% of normal. The Fourth of July has always been a full booking, this year there was not one unit used. "This is the first time since we bought the Overton Motel, I have went for three months without a salary," it was stated.

Where previously there were no vacancies or homes for sale, now there are many.

If nature had been responsible for the conditions causing this loss to the Valley that would have been easier to accept. It is the general feeling the management of the waters of the Colorado River ~~is~~ are responsible for the loss it will take many years to build up.